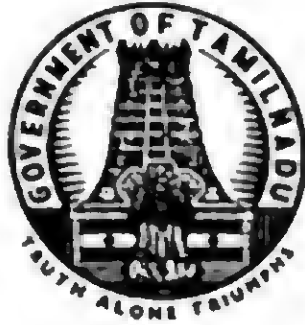




Handbook of the
MADRAS GOVERNMENT
MUSEUM



HANDBOOK
OF THE
MADRAS GOVERNMENT MUSEUM

EDITED BY
S.T. SATYAMURTI, M.A., D.Sc., F.Z.S.
(Superintendent, Government Museum, Madras.)

Published by :
THE PRINCIPAL COMMISSIONER OF MUSEUMS,
GOVERNMENT MUSEUM
Chennai - 600 008.

First Edition : 1964
Reprinted : 1998

© Commissioner of Museums,
Government of Tamil Nadu

Price : Rs.

Title : Handbook of the Madras Government Museum
Published by : **Thiru. S. RANGAMANI, I. A. S.**
Principal Commissioner of Museums
Year : 1998
No. of Copies : 1000
Price : Rs. 80/- (Rupees Eighty Only)

Printed at : Seawaves Printers, Chennai - 14. ☎ : 8224169
Type Setting : Lazer System, Chennai - 14. ☎ : 8230878



SAKUNTALA
By Raja Ravi Varma
National Art Gallery, Madras

CONTENTS

| | PAGE |
|--|------|
| 1. Introduction | iii |
| 2. The Madras Government Museum Historical Sketch | 1 |
| 3. Archaeology | 20 |
| 4. The National Art Gallery | 43 |
| 5. Numismatics | 47 |
| 6. Anthropology | 56 |
| 7. Zoology | 83 |
| 8. Geology | 100 |
| 9. Botany | 106 |
| 10. Chemical Conservation Section | 115 |
| 11. Children's Section | 129 |
| 12. Research and Publications | 132 |
| 13. Educational Services | 148 |



Fig. 1. GOVERNMENT MUSEUM, MADRAS — GENERAL VIEW.

PLATE II

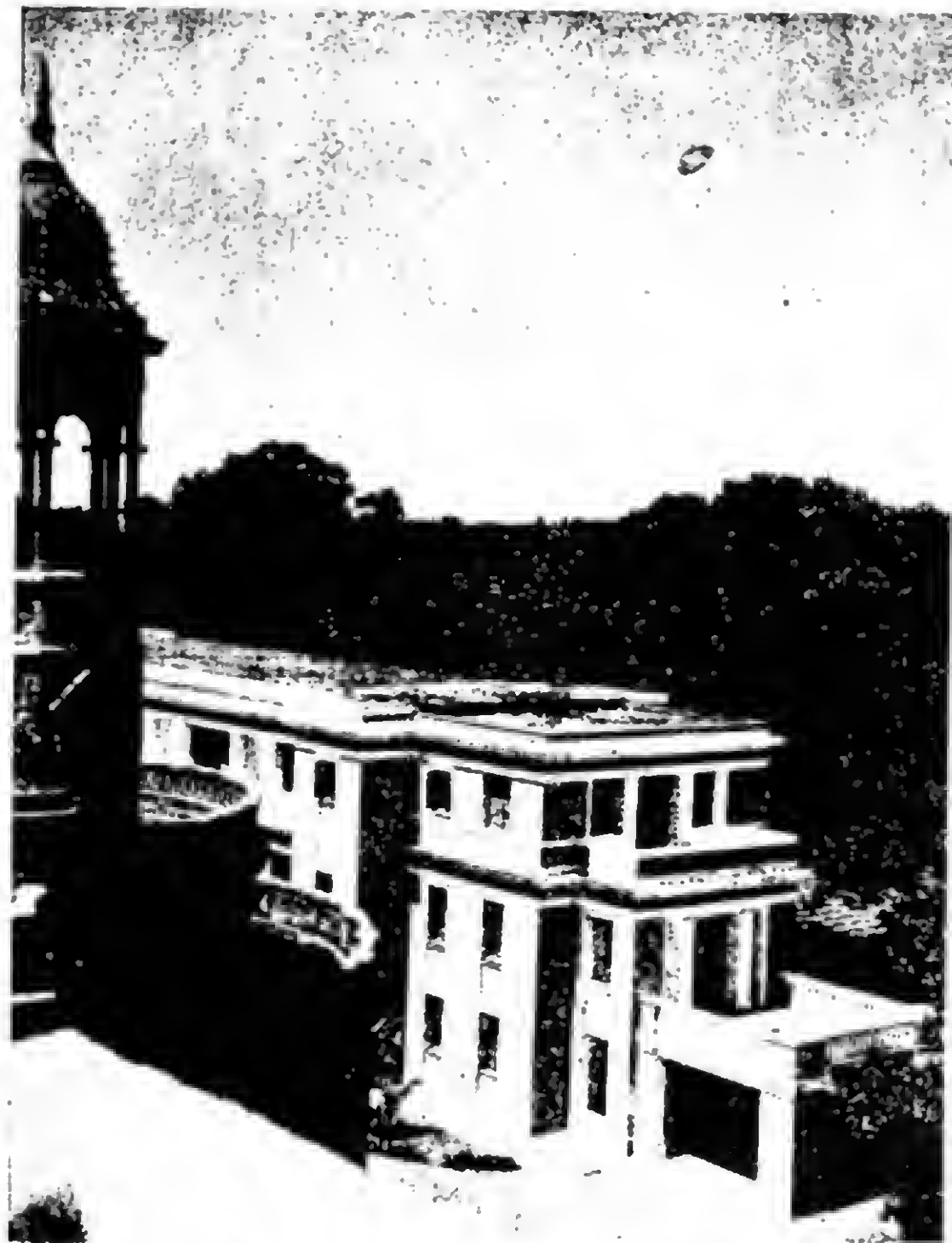


Fig. 2. THE NEW EXTENSION GALLERIES

INTRODUCTION

The Madras Government Museum is the largest and the oldest of the State Museums in India. Since the time of its inception in 1851, it had steadily developed and expanded under the guidance and supervision of a succession of able directors. Beginning as a Museum of practical geology, its scope was soon extended to cover other fields such as Archaeology, Ethnology, Pre-history and Natural History. In 1951, the Museum celebrated its Centenary, having completed hundred years of fruitful service to the public as a pioneer educational institution in the State. The Centenary celebrations were inaugurated by the Prime Minister, Pandit Nehru, on November 27, 1951. As part of the same function the Prime Minister also declared open the National Art Gallery, sponsored by the Government of Madras. A very informative and well illustrated Centenary Souvenir, giving a detailed historical sketch of the Museum and glimpses into the priceless treasures contained in its various sections was brought out on the occasion. Unfortunately, this Souvenir has since become out of print, but the need for a similar handbook on the outstanding collections and the growth and activities of this Museum is now beginning to be increasingly felt, as there has been a growing awareness in recent years of the vital role that Museums can play in modern life. It is precisely to fulfil this need that the present Handbook has been prepared. Essentially, it is a revised edition of the Centenary Souvenir, with the material completely rewritten and brought up to date, but at the same time, with much of the text that was appropriate only for the occasion, necessarily omitted. The chapter on the Historical Sketch of the Museum follows practically the same lines as that of the corresponding chapter in the Centenary Souvenir, but the chapters on the collections in the various sections of the Museum have been largely re-written, enlarged and brought up to date. Much useful additional information on the Children's Section, Research and Publications and the Educational activities of the Museum have also now been included so as to give the reader a comprehensive idea of the part played by this Museum in research and popular education. An attempt has also been made to make the handbook as fully illustrated as possible.

The Madras Museum continues to be immensely popular as an educational institution in this State, and its activities have expanded enormously in all directions in recent years. The National Art Gallery, Madras, which was thrown open to the public in 1951, and the Children's Gallery that has recently been organized, are added attractions which have contributed greatly to the popularity of this Museum. With the merger of the Pudukkottai State into the Madras State, the Pudukkottai Museum also became administratively annexed to the Madras Government Museum, and this may well prove to be a starting point for the establishment of a network of regional museums all over the State.

The Madras Museum is organized into the following sections : Art, Archaeology, Anthropology, Numismatics, Zoology, Botany and Geology. There is a well equipped Chemical Laboratory which handles conservation and restoration of antiquities. Each of these sections and the Laboratory are in charge of Curators who are qualified in their respective fields. The object of the present handbook is to provide a concise but informative account of the principal exhibits and collections in each of these sections, highlighting particularly those features for which this Museum has been internationally reputed, including, among others, its activities as a research and educational institution.

THE MADRAS GOVERNMENT MUSEUM HISTORICAL SKETCH*

SURGEON EDWARD BALFOUR

First Officer-in-Charge (1851-1859)

It was in January, 1851 that the Court of Directors of the East India Company accepted the offer of Surgeon Edward Green Balfour to be the Honorary Officer-in-Charge of the Madras Central Museum, though their actual approval of the suggestion made by the Madras Literary Society for the formation of a Museum of Madras goes back to the year 1846. Dr. Balfour began his work of arranging the geological collections of the Madras Literary Society towards the end of 1850, but the real beginning of the Museum was in 1851, with the appointment of Dr. Balfour as its organiser.

He was then the Chairman of the Committee of the Madras Literary Society and also the Secretary of the Central Committee of the 1851 Exhibition. It was most unlikely that a more versatile person than Dr. Balfour would have been available at that time or at any time for starting and developing the Museum in the room on the upper floor of the College, with the collections, mostly geological numbering about 1,100 of the Madras Literary Society as its nucleus. A few sculptures were lying on the green in front of the College, to which the Government proposed to add the duplicates left over after despatching the exhibits for the Great Exhibition of London in 1851. Dr. Balfour worked hard to reduce to some order the miscellaneous collections which had accumulated in the Society's premises.

Collection Campaign — Dr. Balfour launched an intensive campaign for collecting material for the Museum and in this connection he wrote letters to a vast number of army engineers, medical officers and his personal friends in India, Burma, Malaya and England for gifts to the Museum. Among the distinguished men to whom

*Extract from "Hundred Years of the Madras Government Museum", by Dr. A. Aiyappan (Centenary Souvenir, 1851-1951, of the Government Museum, Madras).

Dr. Balfour wrote for help was Sir Charles Lyell whom his (Balfour's) uncle, the well known parliamentarian Joseph Hume, had introduced to him. Dr. Balfour's appeal was followed up by a general appeal made by Government themselves.

In response to these requests, gifts were received at the rate of about 1000 specimens a month. The Oriental and Screw Navigation Companies permitted their ships to bring to the Madras Museum small packages free of charge. The Army Commissariat made the cases and fittings and the Museum was thrown open to the public early in 1851. The notification regarding the opening of the Museum to the public first appeared in the Fort St. George Gazette, dated April 29, 1851. The public began to come to the museum, at first in very small numbers, from July, 1851 from which month we have statistics of visitors. The number of visitors steadily increased as the years went by. Balfour did not set any limits to the scope of the Museum as he believed that if the Museum were limited in its objects, it would never be formed, because the residents throughout the country, being rendered doubtful as to what would be acceptable, would refrain from sending anything.

By August, 1853, the Museum had a total of 19,830 specimens and the rooms on the upper floor of the College were so over-crowded that Dr. Balfour was forced to ask the Government for a separate building and while this was being built he wanted the Hall of the College, which was very occasionally used for public meetings and entertainments to be given over for the use of the Museum. The latter request was not granted as Government considered that the public should not be denied the privilege which they had long enjoyed of using the College as a place for meetings, etc. But within a few months, Government were forced to a quick decision on the question of accommodation of the Museum as the upper storey of the College was damaged by the weight of the cases. It was therefore decided to move the Museum to the Pantheon which was then occupied as the Cutcherry of the Collector of Madras, and this was done in December, 1854. The Pantheon then consisted of two long halls and two small wings and two outhouses. Of this old structure, very little remains except the plinth and a part of the ornamental floor of the two rooms where foreign animals are now exhibited.

Local Museums - While developing the Museum at Madras, Dr. Balfour continued to ask friends at Bangalore, Bellary, Coimbatore,

Cuddalore, Ootacamund, Secundarabad, Mangalore, Tiruchirapalli, etc., to start local museums on the lines suggested by General Cullen who was at the time engaged in organizing a museum at Trivandrum. By the middle of 1855 there were in all six local museums, attached to the Madras Museum, within the Civil Province of Madras and these were at Bellary, Coimbatore, Cuddalore, Mangalore, Ootacamund and Rajahmundry. However, as these local museums received little support and attention, five of them closed down by 1861 and the one at Rajahmundry in 1875.

The Museum Zoological Gardens - Dr. Balfour tried keeping a few wild animals in the Museum gardens, as an experiment, and these proved to be very popular with the visiting public. A notification similar to that of 1851 was issued on 20th September, 1855 asking for donations of animals to the Museum Zoological gardens. By the first half year of 1856, the Madras Museum had a Zoological garden with 360 animals. The mortality among the animals was great and their prices were always high. Yet the trouble and expense were both worth while because at a per capita cost of three pice or one farthing, 600,000 visitors were furnished with the cheapest gratification. In 1863, the City Municipality took over the Zoological gardens and removed it to its present site in the People's Park.

Visitors to the Museum - The phenomenal increase in the number of visitors to the Museum during Dr. Balfour's term of office bore eloquent testimony to the growing popularity of the Museum. This was largely due to the novelty and popularity of the animals in the Museum Zoological gardens, and the number of visitors fell when the Zoo was transferred to the People's Park. The Museum was not only a place of amusement for the people but also fulfilled a long felt need educationally. Before the starting of the Museum, there were no means of imparting instruction in any branch of Natural History, but now (1855) the Museum had ample material for teaching mineralogy, palaeontology and vertebrate zoology. By 1859, Dr. Balfour believed that the Museum had established its popularity and won the confidence of the local community. The admission to the Museum has been throughout free and Dr. Balfour resisted all suggestions for the levy of an admission fee. On April 15, 1856, he told Government that the public had earned their free admission to the institution by their liberal donations to it.

Staff and Organisation of the Museum - Dr. Balfour started with one writer. By 1859, he had a Curator, an Assistant Curator a Writer and a Librarian and record Keeper, seven hamals, three animals mounters, three gardeners and eight animal keepers for the Zoological gardens, the total monthly cost of the establishment being Rs. 232-8-0

The departments of the Museum were as follows :-

- (1) Natural History, with Zoological gardens.
- (2) Geographical geology.
- (3) Economic geology.
- (4) Public Library (added in 1853).

CAPTAIN JESSE MITCHELL

Part-time Superintendent (1859-1872)

Lieutenant (later Captain) Jesse Mitchell, an army officer who was then working in a civil post as Commandant of the Madras Mounted Police was appointed to succeed Dr. Balfour on May 15, 1859. Before he came to the Museum he was keenly interested in microscopy and natural science.

The Museum Library - Captain Mitchell was a steady, modest and hardworking person, who, though he did not claim anything like the eminence and versatility of Dr. Balfour, had very clear ideas of the functions of the Museum. He realised that a library was quite essential if the Museum were to fulfil its functions adequately and so in 1860 he asked Government for funds for a reference library. Captain Mitchell started purchasing books, mostly second hand for the sake of economy, with the help of a scientific friend of his, books on applied sciences being specially preferred. Captain Mitchell might be regarded as the originator of the Connemara Public Library, for it was from the Museum Library which he commenced in 1860 that the Connemara Public Library developed. The Museum Library was thrown open to the Public in June, 1862; admission to it was free, but regulated by tickets.

The Museum Collections - The scope of the Museum collections continued to be as wide as it was in the days of Dr. Balfour.

Captain Mitchell, in fact, followed very scrupulously in the footsteps of his distinguished predecessor. Collections in Natural History continued to be on an international scale, from Europe, Australia and even America. Among the interesting collections received during Captain Mitchell's time were a series of casts of British fossils and six specimens of stone and four specimens of iron aerolites in return for the Parnallee and Nellore aerolites presented by the Madras Government to the British Museum (1862). Shells, fish, birds, insects and fossils came from several museums in exchange for similar material sent from Madras. Major Michael secured in 1865 for the Museum the femur, tibia and tarsus of *Diornis*, the Moa, an extinct bird from New Zealand. Two elephant skeletons were secured for the Museum in 1866 through the initiative and interest taken by the Governor when at Ootacamund where the animals died.

The Museum Herbarium was built up by contributions made particularly by Colonel Beddome of the Forest Department.

The collection of models of machines continued, some examples got by Captain Mitchell being the model of a high pressure steam engine (gift, 1860) and an oscillating air pump.

The Museum had, upto 1865, only a very small collection of coins. Captain Mitchell began to add to this small collection and to collect medals illustrative of the history of the Madras Army.

In 1861 began the contacts between the Madras Museum and Robert Bruce Foote of the Geological Survey of India. To Foote's work for the Museum and the Foote Collection of Prehistoric Antiquities which the Museum purchased, reference will be made later on.

In 1865 the Tanjore armoury was transferred to the Museum from the Arsenal, Fort St. George, after prolonged correspondence spread over thirty months. Captain Mitchell also continued the efforts begun in 1854 by Dr. Balfour to secure more of the Amaravati sculptures for the Madras Museum.

Captain Mitchell added during his tenure of office no less than 72 009 specimens to the museum. Although his main work as a police official took a great deal of his time, his achievements for the museum were substantial. His contemporaries, including the Governor who was a constant visitor to the Museum, appreciated his work.

Surgeon GEORGE BIDIE, M.B., C.I.E.

Part-time Superintendent, (1872-1884)

Dr. George Bidie succeeded Captain Mitchell as part-time Superintendent of the Museum on August 7, 1872. Dr. Bidie had at the same time conjoint charge of the post of Secretary and Statistical Officer to the Surgeon-General. He was deeply devoted to his favourite subjects, Botany and Pharmacology and keenly interested in making South India agriculturally more efficient. He was equally eager in spreading scientific knowledge through the agency of the Museum. Over the question of the arrangement and display of the Amaravati marbles in the Museum (1884-85) he had to face bitter criticism from no less a person than Burgess of the Archaeological Department of the Government of India, but while the distinguished archaeologist demonstrated more of dogmatism and temper, Dr. Bidie showed himself that he was the master of the situation and what he did was the only practical way of dealing with the sculptures. Dr. Bidie will also be long remembered in this State for his special work on Cinchona Cultivation. As he was the leading botanist and pharmacologist of his day in Southern India, his advice was eagerly sought by businessmen, planters and horticulturists. He made substantial contributions to knowledge on commercial cultivation of a number of medicinal plants, on grasses suitable for paper manufacture and on control of cactus by the cochineal insect.

Botanical Section strengthened--While geology was the chief field of activity during Balfour's time and zoology during Captain Mitchell's time, botany gained most during the period of Dr. Bidie's stewardship of the Museum. Medicinal plants, plants of economic importance, and rare exotic trees, such as the Japanese lacquer tree were actually grown on the Museum grounds where Dr. Bidie also tried several forest conservancy experiments on a small scale. In 1873-74, the Herbarium was enriched by the purchase of Lieutenant Colonel Beddome's herbarium at a cost of Rs. 1,500. The collection contained 2,435 specimens, most of which were rare plants. A good collection of forest products specially made and labelled under the supervision of the Director General of Forests was added to the Botanical Section in 1878.

Ethnology and Antiquities--Dr. Bidie was a corresponding Member of the Italian Society of Anthropology and Ethnography; and he included Ethnology as one of the subjects to be illustrated

by Museum collections. The collection of pottery, etc., from the ancient burials of the Nilgiris, now known as the Breeck's collection, reached the Museum in 1878. Sculptures such as a large Buddha image from Tirunelveli, further lots of sculptures from Amaravati, photographs of tumuli from Salem (1873-74) and from Coimbatore (1877-78) and burial pottery from these early monuments began to come to the Museum. The nucleus of the large collection of copper plate grants was built up during his period. Dr. Bidie became a very keen numismatist and the collection of coins begun by Captain Mitchell was considerably enlarged by him.

R. B. Foote, the father of Indian pre-historic archaeology, made his discoveries of early man in the valley of the Courteliar river during this period and the Madras Museum received some of these finds as gifts.

Amaravati marbles exhibited—The famous Amaravati stupa was discovered by Colonel Mackenzie about the year 1801. In 1830 some of the sculptured slabs were brought to Masulipatam to beautify a pettah named after Robertson, the District Collector. In 1835, Sir Frederick Adam, Governor of Madras, ordered that these should be sent to Madras to be preserved in the Museum of the Madras Literary Society. In 1856, the first batch of these slabs arrived in Madras through Dr. Balfour's efforts, but in 1859 most of these were sent to Her Majesty's Secretary of State for India and lodged in the India Museum. Other batches of sculptures were secured during Dr. Bidie's time and they were set up in their present location in the Madras Museum. The task of arranging these heavy and delicate sculptures in a hall too small for them was by no means an easy one.

Although Dr. Bidie's attempt to reconstruct the railings of the Amaravati Stupa was severely criticized by Dr. Burgess of the Archaeological Survey, the Government of Madras fully concurred with Dr. Bidie as they were convinced that it was the only practical way of accomplishing the task.

Acquisition of a Whale skeleton—Surgeon Major M. C. Furnell, F.R.C.S., officiated as the Superintendent of the Central Museum for about eighteen months from June, 1874 during Dr. Bidie's absence on sick leave in Europe. The most important event of the year 1874 was the acquisition of the skeleton of a Whale for the Museum. This enormous sea mammal was cast ashore near Mangalore and was secured for the Museum by Mr. Thomas, the

Collector. Its skeleton was carefully articulated and exhibited in the museum with commendable skill.

New Library and Lecture Hall—The Library and Lecture Hall, begun in December, 1873 were completed in 1875, and were formally opened by His Grace the Governor on March 16, 1876. Fine sets of maps and pictures of archaeological interest were hung up in the Library. When the Connemara Public Library buildings were completed in 1896, this Library with its fittings and the Lecture Room housed the Oriental Manuscript Library till 1935. When the latter moved into the University Library buildings in Chapauk, the Museum again got the use of the old Library building. This is the present Centenary Exhibition Hall which is being used for special art exhibitions periodically.

International Exhibitions—During Dr. Bidie's tenure of Office, the Museum participated in several international exhibitions at Paris (1878), Sydney (1879), Melbourne (1881), Amsterdam (1883) and London (1883). Although these exhibitions were a severe additional burden on the staff, they helped to raise the prestige of the Museum in the eyes of foreigners and provided opportunities for adding substantially to its own collections. It may be of interest to record here that the Head Taxidermist of the Museum, Mr. Anthony Pillay, won a silver medal at the Fine Arts Exhibition held in England for a group of birds and reptiles prepared by him. In 1877, he won another silver medal for "preserved fish specimens" from the Maritime Piscatorial Exhibition held at the Royal Aquarium, London.

Public Lectures at the Museum—From 1873, free public lectures began to be delivered under the auspices of the Museum. The lectures were well appreciated by the public, and proved to be popular both among students and laymen.

Dr. Bidie was made C.I.E. in 1884. He relinquished charge of the Museum in 1885.

Dr. EDGAR THURSTON, C.I.E., F.R.C.S.

Superintendent (1885-1908)

Dr. Edgar Thurston who relieved Surgeon-Major Bidie on October, 12, 1885, was a medical man, but as he was in charge of the Museum at King's College, London, before he came to Madras, he was unlike his predecessors a professional museologist. Dr. Thurston is now best known not for what he did for the Madras Museum, but as the author of the seven volumes of "Castes and Tribes of Southern India".

Change of policy—The first official act of Dr. Thurston was to reverse the policy of his predecessors in respect of the scope of the Madras Museum and to declare that it should be limited to the archaeology, natural history, ethnology, arts and crafts, etc., of the Madras Presidency. He set about the task of first reducing the international collections relating to geology and natural history to a provincial collection. The extra-Indian material were either stored away or given away to other institutions. This narrowing down of the scope of the museum was probably dictated by practical and financial exigencies but turned a good part of the work done from 1851 to 1885 into a waste of money, effort and time. However, as the years went by, it was realised that such rigid limitation of the scope of the Museum was not altogether healthy for the growth of the Museum, and the Madras Museum now contains more extra-provincial material than during Thurston's days, particularly in pre-history and archaeology. Even in geology and natural history extra-provincial and extra-Indian have had to be got, on a very limited scale, when they were necessary in the interests of interpreting objects of the province in their proper perspective.

Dr. Thurston turned his attention to complete the collection of marine fauna of the Madras Coast. By about 1890 he began to pay special attention to ethnology and strengthen the ethnological section of the Museum. The block of buildings now known as the Front Buildings, the Theatre and the Connemara Public Library, were sanctioned in 1890. During Dr. Thurston's absence on special duty as acting Reporter of Economic Products, at Calcutta, Mr. H. Warth of the Geological Survey acted in his place from 1891 to 1893. During this time, the large whale shark, which was washed ashore on the Madras Beach was mounted and exhibited. Warth also tried the novelty of exhibiting donations for six months in special cases, before these were distributed to the various sections.

The Relic caskets of Bhattiprolu and more sculptures from Amaravati were received from Mr. A. Rea of the Department of Archaeology. In all branches of the Museum, collection went on at a steady pace.

The idea of publishing the Madras Museum Bulletin took shape in 1893.

The Connemara Public Library—The "Technical Institute", Connemara Public Library and Theatre Buildings were completed in 1896. The Library was named after Lord Connemara, Governor of Madras, who was a brother of Lord Mayo.

The Victoria Memorial Hall—In 1902-03 Government expressed their willingness to provide a site for the Victoria Memorial in the Museum grounds. Later, this decision was modified, and the Government granted "free of assessment to the Council of the Victoria Technical Institute the entire site of Marlborough House, Egmore measuring 4.076 acres for the erection of an institute in commemoration of Her late Majesty Queen Victoria. The Government gave not only the site, but also a liberal contribution to the building fund. Dr. Thurston also drew up plans for the Madras Aquarium which was opened to the public in 1909, but it was taken over in 1910 by the Fisheries Department.

Thurston's Contribution to Anthropology—Dr. Thurston was appointed Superintendent of the Ethnological Survey for Madras in 1901, and in his survey work he was ably assisted by Sri K. Rangachari. The Madras Museum soon became a centre for active research in Anthropology under Dr. Thurston's able guidance.

In 1904-5, Government purchased for the Museum "the pre-historic and proto-historic collections brought together, in the course of his long service in India, by Mr. R. Bruce Foote." This collection was a very valuable addition to the Museum as it contained an enormous number of palaeolithic and neolithic celts, hammers, mealing stones, bangles, beads, etc., from Salem, Bellary, Anantapur, Kurnool and other districts.

During Dr. Thurston's term of Office, the Museum underwent rapid development in every direction. The addition of the Connemara Public Library and the New Building in 1896 greatly increased both the size and the scope of the Institution. The numerous publications of Dr. Thurston particularly in the fields of Anthropology and Numismatics, bear eloquent testimony to the quality and extent of his work.

Dr. J. R. HENDERSON, M.B., C.M. C.I.E.,

Superintendent (1908 - 1919)

Dr. John Rober Henderson, who succeeded Dr. Thurston in 1908 was already connected with the Museum as its Honorary Assistant Superintendent. Before he joined the Museum, he was Professor of Biology in the Madras Christian College from about 1892, and had done original work of a high order on Crustacea.

By this time the collections of the Museum had grown enormously during the past quarter of a century and required to be properly arranged, catalogued, labelled, preserved and displayed. Henderson introduced the small habitat groups in the zoological section of the Museum as such groups were of great educational value and rendered the display much more realistic. He had the Botanical Assistant to catalogue the economic products; the pre-historic material was catalogued by Foote and Rea; Henderson himself catalogued the Coins of Hyder Ali and Tippu Sultan in the Numismatic Section and made arrangements for the cataloguing of other classes of coins, for which and other allied archaeological work he got Government sanction for the post of an Archaeological Assistant. Popular lectures at the Museum were continued and gallery talks were arranged regularly for school children. During Henderson's time the Museum began to be better used by school boys as well as teachers. Extensions to the Front Buildings to house arms and weapons and the "pre-historic" collections and to the old buildings for sculptures and the construction of the present office buildings were taken on hand during Henderson's term as Superintendent.

Dr. FREDERIC HENRY GRAVELY, D.Sc., F.R.A.S.B., F.N.I.

Superintendent (1920-1940)

Dr. F. H. Gravelly, who succeeded Dr. Henderson as permanent Superintendent of the Madras Museum in 1920, took charge of his office on 31st January, 1920. Before he joined the Madras Museum Dr. Gravelly was Assistant Superintendent in the Indian Museum at Calcutta for ten years, where he had gained experience of Museum work, of course, limited to Zoology, but at the Madras Museum he had to deal with a very wide range of subjects, some of which were new to him. In his early years, at Madras, Dr. Gravelly concentrated on zoological work. He undertook a thorough investigation of the littoral fauna of Krusadai Island, and this eventually led to the revival

of the Bulletin of the Madras Government Museum for the publication of the results of the researches, firstly on marine fauna, and later of the results of researches conducted by the staff of the Museum in Zoology, Botany, Anthropology, Numismatics, Epigraphy and Archaeology. During Dr. Gravely's term of office the scientific staff of the Museum was considerably strengthened and the post of an Archaeological Chemist was created for the most essential work of Chemical Conservation. Dr. Gravely had the minimum scientific staff to make the Museum a centre of research and not merely the store-house it used to be till the time of Dr. Thurston, and a one-man show that it was during both his and Dr. Henderson's time. No Museum can be worth the name if the collections were not scientifically preserved, carefully studied and interpreted. This second function of a Museum makes it essential that the staff of the museum should do research and publish the results of research as promptly as possible. Intense scientific activity from 1927 onwards raised the prestige of the Madras Museum and gave it a very high status. In their report on Indian Museums, Markham and Hargreaves wrote :

'Research is well to the fore at the Madras Government Museum, and its lengthy list of Publications deals with Archaeology, Ethnology and Zoology. It is also one of the few institutions where researches are being carried out in connexion with the treatment and preservation of Museum exhibits' (Page 77).

Along with research, collection and cataloguing also proceeded at a vigorous pace. The reserve collection in Zoology, particularly of invertebrates, was enlarged and improved. Dr. Gravely's work on Arachnida and Mollusca helped in completing the gallery and reserve collection in these two large zoological groups. The botanical work done by Dr. Gravely and the late Sri P. V. Mayuranathan helped to strengthen the Museum herbarium and botanical collections. The collection of musical instruments, metal images, Venetian coins, Buddhist sculptures from Goli, the Adichanallur skulls and the Manley collection of Stone Age tools were monographed and arrangements were made for catalogues of the Amaravati sculptures, Punch-marked coins, Roman Coins and the Nagapattinam bronzes. These catalogues are not mere lists, but authoritative monographs on the concerned subjects. The Connemara Public Library of which Dr. Gravely was Principal Librarian till 1939 and later Associate Librarian, benefited by having the very large number of periodicals from India and abroad obtained by the exchange of the publications of the Madras Government Museum.

Dr. Gravely's great achievement, which the public of Madras and other visitors to the Museum will long enjoy is the new archaeological extension. The exhibits in this new extension aim at presenting a brief outline of history as revealed by art, of the early empires of northern India and of the principal empires and kingdoms of the south right up to modern times. The chronological arrangement of the stone sculptures in this gallery has made it possible to illustrate Indian History vividly, and this method of illustrating History by actual examples of work, produced in different times and areas has fulfilled long felt need of the general public. A guide containing a brief account of the history of South Indian temple architecture, South Indian scripts, a summary of the history of Indian Coinage and a short outline of Hindu, Buddhist and Jain Iconography was prepared and first released for sale on the day of the opening of the new extension.

Dr. Gravely evinced keen interest in the study of temple architecture, which, till then, was a neglected subject. In the two interesting numbers of the Madras Museum Bulletin (General Series) entitled, "Three Main Styles of Temple Architecture" and "Outline of Temple Architecture," Dr. Gravely and Sri T. N. Ramachandran have given a very clear, logical and simple analysis of the development and mutual regional influences on temple architecture in Southern India.

Dr. Gravely also worked hard to improve the registration of the collections in the various sections, which left much to be desired. The treasure trove registers were first improved incorporating the suggestions made by Mr. F. J. Richards, I.C.S., a great friend of the Museum. In 1931, stock registers of exhibits in the galleries were made and separate accession registers for each of the main sections of the Museum were introduced.

Dr. Gravely not only continued the demonstrations to school teachers begun during Dr. Henderson's days, but delivered talks on class room methods in Natural History which aimed at making teachers Museum minded.

As it was rather premature to publish a full general guide to the museum, when several of the public galleries had not approached a fair stage of completeness, Dr. Gravely introduced a brief six page folder, the Handy Guide, in English, Tamil, Telugu and Malayalam, priced at 6 pies a copy. When the New Extension, opened in 1939, made a chronological display of sculptures possible, Dr. Gravely published the first regular

guide to be issued by the Museum, the "Guide to the Archaeological Galleries" with a companion volume of illustrations. Another new venture was the preparation for sale at the Museum book counter of an excellent set of picture post cards of bronzes in the Museum. The picture post cards were the best sold by any museum in India.

Dr. Gravelly maintained a close co-operative association with the Indian Museum, Calcutta, particularly the Zoological and Geological Surveys, with the Archaeological Survey of India and with Madras University to the advantage of all the concerned institutions. He also enlisted the co-operation of specialists in various fields who were always most generous in their help to the Museum.

Dr. Gravelly relinquished charge of his office on December 5, 1940. Even after his retirement he continues to take keen interest in the Museum. His latest contribution is on "The Temple Gopurams of Tiruvannamalai".

THE MUSEUM IN RECENT YEARS

Dr. A. Aiyappan who succeeded Dr. Gravelly was for about eleven years Curator of the Anthropological Section before he was promoted as Superintendent. He was, thus, not only the first Indian to be in charge of the Museum, but also the first from the scientific staff of the Museum to have the privilege of being the head of the institution.

The period from 1941-46 were very bad years for the Museum. A great part of the Museum buildings and the grounds had to be handed over for an A.R.P. depot which was stationed in the Museum. The galleries left in our charge had to be used as store rooms for the cases etc., removed from building occupied by the A.R.P. depot. The most valuable among the collections such as bronzes, copper plate grants, selected coins, relic caskets of Bhattiprolu, etc., were sent to places of safety in the interior and such of the exhibits, as for instance, the Amaravati sculptures, as were too heavy and difficult to transport, were protected *in situ* by provision of additional teak wood supports to the ceiling and heavy sand bagging. Some of the zoological collections were stored up in the Madras Christian College at Tambaram. After the war was over, it took up about six months to restore the exhibits to their original places.

Growing interest—After the war, gifts and bequests began to be received at the Museum. Sri T. A. Ramalingam Chettiar, Sri T. N. Sethuraman Chettiar, Srimathi A. V. Kuttimalu Amma, the Raja of Ramanathapuram, the Raja of Karvetnagar, the Zamindar of Palayampatti and several others were among the donors. The Hon'ble Ministers in charge of the Museum and the Secretaries to Government in the State Ministry of Education often evinced keen personal interest in the Museum, and His Highness the Maharaja of Bhavanagar, Governor of Madras, issued personal appeals for donations to the new National Art Gallery and Museum.

Notable Additions—The Dowlaishwaram hoard of gold coins of Raja Raja I and Kulottunga I got as treasure trove in 1946 was a most interesting acquisition as the legends on some of the coins were in commemoration of the Chola conquest of Kedah in Malaya. Bent bar punch-marked silver coins of North Western India were also added to the collections recently. Historical documents of the East India Company, a facsimile of the Magna Carta of England (1215 A. D.), Indo-British medals and the Stage Coach used by the British Governors of Madras on ceremonial occasions are among the other notable collections recently added to the collection of miscellaneous objects in the Numismatics section.

An exquisite bronze image of Siva Natesa in the Pandyan style from Poruppumettupatti in Tirumangalam Taluk, Madurai District was received in 1946. In workmanship, it is excelled only by the world famous Tiruvelangadu Natesa bronze. Among the other notable recent additions to the collection of bronzes are: Tripurantaka and Tripurasundari from Tranquebar, Tanjore District; Vinadhara and Parvati from Puthur East, Salem District, Rama, Sita, Lakshmana and Hanuman from Tiruvelangadu, Tanjore District and the Jain Tirthankaras Padmavati Yakshi from Singanikkuppam, South Arcot district and an Ardhanarisvara and Chandikesvara from Tiruvenkadu, Tanjore Dt. The Rama group mentioned above and the Ardhanarisvara and Chandikesvara have been exhibited respectively in the Vaishnavite and Saivite images gallery. Other recent additions of outstanding interest are: a score of large sized wood carvings from temple car from Kalaiyarkovil, Ramnad District, copies of mural paintings from Sigiriya, Ceylon, Sittannavasal, Pudukkottai, the Big Temple, Tanjore, various places in the former Travancore State and Srirangam and Ramesvaram.

Four very impressive, life-size models in wood of Kathakali dancers, a model of the Brahmagiri Cist burial of the early Andhra period, stone tools of the Peking Man, Shadow Play figures from Malabar, Cuddappah and from Angkor Vat, French Indo-China were few other important additions.

Educational work—From 1941 onwards, several conferences were held with the representatives of teachers organizations in the city, and new experiments were tried in the field of education through the Museum. Through the Radio, educational journals and gatherings of educationists the possibilities of using the Museum to supplement school activities were repeatedly brought to the notice of the teaching profession and the officers of the Department of Education. Gifts to schools which were trying to build up museums of their own were made from the reserve collection of antiquities of the stone age, early iron age and proto-historic periods. Surplus coins and plaster casts of coins also began to be regularly sold to schools and other collectors. Very recently, however, as part of the Audio visual programme of the Museums' educational service, sets of electro plated metal casts of coins illustrating the history of India's coinage from the earliest times up to the time of the East India Company, have been made and offered for sale to schools and institutions, with an explanatory booklet entitled "Coins of India through the Ages". A scheme for sending out sets of Indian paintings to schools in the State on loan for limited periods has also been started recently and is proving to be very popular.

In response to a request from the Director of Public Instruction to participate in the grand Educational Exhibition at Guindy, in December, 1949, a "Model School Museum" was organized as one of the eight sections of the Exhibition. By participation in the Educational Exhibitions every year, the Museum has definitely made its entry into the educational scheme of the Madras State.

In 1949, the first summer course in Museum Technique for teachers was organized by us, in order to help teachers of high schools in the State to equip themselves better for the task of organising school museums. During the period, May, 1949 to March 1950, three batches of teachers were trained. The Department of Public Instruction has recognized Museum Technique as one of the crafts for which teachers trained in it can draw the special craft allowance. The Course in Museum Technique in 1951 was limited to two batches of 34 teachers from training institutions,

in order that the teachers so trained, may, in turn, train other teachers. Since 1956, Government have included the Teacher's training course in Museum Technique as part of a general scheme under the Second Five Year Plan. Under this scheme, 80 teachers from schools all over Madras State are trained at the Museum in two batches of 40 each every year during the summer. A handbook on museum methods for teachers prepared by the Curators has been published recently.

The Problem of the Illiterate Visitors—A very large proportion of the visitors to the Museum, unfortunately, happen to be illiterate and unable to read the labels in English or in Indian languages. As the best way to deal with this problem is to employ guide lecturers, Government sanctioned two posts of Assistant Curators in 1949, one for the Natural History sections and the other for the General Sections. In addition to helping the Curators, these Assistant Curators act as guides to illiterate visitors. But as the number of visitors is very large, often over a thousand a day, it is difficult for the two Assistant Curators alone to cope with them. As an experimental measure, therefore, boy scouts were trained for short periods in order to enable them to supplement the guide service of the Assistant Curators, but this was given up later. Recently, special Gallery Guides have been appointed.

Special Exhibitions and Publicity—Since 1946, the system of announcing all notable accessions in the newspapers has been introduced in order to give wider publicity to the Museums' collections. Special exhibitions of new accessions and of interesting reserve collections have been arranged from time to time, often preceded by popular, illustrated handouts for the Press. These special exhibitions have throughout been popular and brought to the Museum thousands of visitors who, but for them, would not have come to it. The special exhibitions involve a great deal of extra work, but they are well worth the trouble, for they enable the public to see several exhibits which cannot be exhibited for want of space. Attractive posters recently printed, both in Tamil and English, have also helped greatly in giving wide publicity to the Museum.

Trial excavations at Arikamedu—Under the impetus given by Prof. G. Jouveau - Dubreuil, in 1940 and with the financial aid given by the French India Government at Pondicherry trial excavations were conducted at Arikamedu, which revealed the foundations of several buildings. Amphorae and beads typical of the Mediterranean area were also recovered. Sufficient evidence was thus gathered to show that Arikamedu was one of

the most ancient sites in Southern India. *The Hindu* of Madras gave the excavations very wide publicity through a special article contributed by the Superintendent. The information was passed on to Dr. Mortimer Wheeler, the Director General of Archaeology in India, who took up the excavation at Arikamedu, which proved so fruitful. Thus the Madras Government Museum for the first time in its history undertook trial digging and became directly instrumental in getting a most important piece of archaeological work done.

The Pudukkottai Museum—After the merger of the Pudukkottai State with the Province of Madras in 1948, the Government ordered on January. 31. 1949, that the Pudukkottai Museum should be a regional Museum under the control of the Madras Museum. As we look into the future, it seems probable that more local museums will be started in the near future.

The National Art Gallery—In 1941-42, seventy seven pictures belonging to the School of Arts which were about to be sold were transferred to the Museum. Copies of a few murals of Ajanta, Sigirya, Panamalai and Central Asia, and a small number of paintings by modern artists were purchased by the Museum. In 1946, the South India Society of Painters was organized at Madras through the efforts of Col. D. M. Reid and Dr. A. Aiyappan and from the beginning the Society had the latter as one of its secretaries and its office in the Museum House. Periodical exhibitions of the works of modern Indian painters and occasionally also of artists from foreign countries were held at the Museum under the joint auspices of the South Indian Society of Painters and the Government Museum. In 1949, Government sanctioned the renting of a hall belonging to the Victoria Technical Institute (a low, tiled building behind the Victoria Memorial Hall) to be used temporarily as the Picture gallery.

The efforts that originated from the Museum from 1941 onwards which were supported by private donors and the South India Society of Painters culminated in 1951 in the Government finally giving their approval to the organisation of the National Art Gallery of Madras and the taking over of the Victoria Memorial Hall of the purpose on a rent of Rs. 500/- per mensem. The National Art Gallery was declared open by the Prime Minister, Pandit Nehru, when the Museum celebrated its Centenary in November, 1951.

One of the principal aims of the National Art Gallery is to show under a single roof masterpieces of arts and crafts of ancient South India and to display select works of art of

modern times. To advise the Government in matters pertaining to the selection of works of art and the designing of the building and display in the gallery, a Special Committee was constituted consisting of officials and experts in practical art and art criticism. To begin with, ancient masterpieces of bronzes including the world famous Tiruvelangadu Natesa and minor arts like ivory carvings from various parts of South India contained in the Museum collections were transferred to the National Art Gallery. For the paintings and sculptures by modern artists purchased annually, a room is allotted at the rear end of the gallery. The most noteworthy among the exhibits in this room are the four exquisite oils by Raja Ravi Varma, the 'Temple Steps' in oils by Sri Devi Prasad Roy Chowdhury, the 'Mother and Child' by Sri K. C. S. Panikkar and the Portrait study of Pandit Jawaharlal Nehru by Sri S. N. Chamkur.

Of the other paintings on display, the most interesting ones are the two old tempera works from Andhradesa and the portraits of the Tanjore Rajas. The section devoted to North Indian schools of painting include a couple of interesting paintings of the Kangra School, a group of four Ragini paintings of the Rajasthani School and a group of three or four of the Mughal school. A factual catalogue of exhibits in the National Art Gallery is available for sale.

Reorganization and Development of the Museum :—Vast schemes of modernisation and expansion of the Museum have now been taken up for execution, thanks to the liberal financial assistance received from the Government of India during the past two years. Several galleries (notably the Bird, Economic Botany, Ethnology and the Metalware and Industrial Arts galleries) have been modernised by the introduction of up-to-date built-in show cases with concealed internal artificial illumination. Several attractive dioramas with painted backgrounds and modelled foregrounds have been built and installed in these modernised units in the Bird gallery. The Chemical Laboratory has been expanded by the addition of a two storeyed block and two new buildings, a Natural History Block, and a Gallery for the Museum's well known collection of bronzes have also been constructed to accommodate the ever increasing collections. The Museum may therefore look forward with legitimate optimism, to a future of continued progress and expansion in the years to come.

ARCHAEOLOGY

By

P. R. SRINIVASAN, M.A.

(Formerly Curator for Art and Archaeology)

The history of India, unlike the histories of several western countries, has got to be pieced together from the remains of her material culture. It is interesting to observe that such remains of material culture of the past, abound in India. A systematic and scientific study of them reveals the glories of bygone times in every branch of human activity. This is the case both of the material culture of the historical times and the cultures of prehistoric and protohistoric times. For the latter, reference may be made to the chapter on Anthropology. In this section the cultural history of the historical periods as evidenced by the antiquities that have come down to us will be briefly dealt with, with special reference to South India. The materials for this study are chiefly those displayed in the archaeological section of the Government Museum Madras.

As in the rest of the world, in India also the prehistoric man was very active and had left behind him a variety of lithic tools and implements which give one a glimpse into the life of the prehistoric human society of India. The next important stage in the history of India was, as usual, the age when metal and stone were together employed by the people for a variety of purposes. This stage is represented by the vast quantities of antiquities discovered at Mohenjodaro, Harappa and Chanhudaro, places which have gone over to Pakistan and Lothal in the Cutch. Though these are of little use in understanding the history of those times of South India as the only known remains of the protohistoric periods of India, they are significant. The nature and character of the people who were responsible for these protohistoric civilizations cannot be known precisely owing to the great difficulty experienced in deciphering the special variety of picture writing of those times which are met chiefly on some kinds of seals. This is followed by the age of the people who used iron profusely and built tombs of big stones (mega-lith) for the dead people. The megalithic builders abounded all over India, but their number seems to have been large in the Deccan and South India. Unfortunately very little of their history can be known because they did not leave behind

them any written records. All that can be known of them is confined only to the materials that can be obtained from their tombs. Though these people were widely distributed, it is still a matter of dispute amongst scholars as to where these people originated and when and how they disappeared. According to the present day workers in the field, the earliest megalithic builders might have started on their career somewhere about 1000 B. C. and their descendants might well have continued into early medieval times.

Side by side with the people who built the huge stone tombs were living the people who were more sophisticated in their ways of life. This is true at any rate from the time of the great Buddha who is said to have lived in the sixth-fifth century B. C. But strangely enough till about 300 B. C. one could lay ones hand hardly on any tangible material that speaks of the material cultures of these times. Thus only from about the end of the 4th century B. C. antiquities which can be approximately dated have been known. This is the case with North India. In the Deccan, except a few antiquities dating from the 3rd century B. C., the remainder belongs to dates later than 200 B. C. In the far South, except a few inscriptions which are said to belong to the 3rd—2nd century B. C., the rest belong to dates later than the 5th century A. D.

The antiquities which reveal the story of the life of the ancient people are broadly classified into (a) inscriptions, (b) sculptures, (c) architecture (d) paintings and (e) coins. Of these, coins are dealt with in the chapter on Numismatics. Amongst these groups of antiquities the most important, from the point of view of chronology and other aspects of social life, is that of inscriptions.

The Madras Museum can claim, with justifiable pride, to be the only Museum in the whole of India to possess a unique collection of inscriptions on stone and copper plates. Other stone inscriptions are those that have come down from Amaravati, Bhattiprolu, and other places and the metal inscriptions are in the form of grants, etc., written on copper-plates. These belong to various periods and localities. The inscriptions engraved on the sculptures from Amaravati and the Bhattiprolu stones inscriptions are displayed in the Buddhist Sculpture gallery. These are the earliest examples of the art of writing from South India and the earliest of them date from the 3rd-2nd century B. C. Among the inscriptions from Bhattiprolu one is

inscribed on a large hexagonal crystal head. This is however, kept in safe custody in the reserve collection, for reasons of security. The writing of these earliest inscriptions as those of the writing occurring in the caves of the ancient Pandyan territory is akin to that of the Asokan edicts but with a distinct difference. The alphabet of Asokan edicts with the exception of the edicts occurring in the Gandharan area is Brahmi. And the variant script in which the inscriptions from Bhattiprolu and the Tamilian caves are written is called the Southern Brahmi. The language of all these inscriptions, except the inscriptions of the Tamilian caves, is a variety of Prakrit. The language of the ancient inscriptions of Tamilnad is, however, a mixture of Tamil and Prakrit. Tamil, however, predominating.

The stone inscriptions of later periods belonging to the Cholas, the Pandyas, the Kalingas, etc. are displayed in the archaeological shed behind the Chemical laboratory. A select group of these is displayed in the epigraphical bays in the right wing of the mezzanine floor of the New Extension. This gallery of epigraphs also contains plaster of Paris casts of a few representative specimens of writings on copper-plates. The originals of copper charters numbering over 400, are, however, kept in safe custody. It may not be out of place to repeat here that perhaps nowhere else in the world is there such a large collection of ancient charters some of them written on both sides in more than one script and language of big and heavy copper plates sometimes numbering over ten or fifteen. One of the charters deserves special mention. It is the one obtained from Tiruvelangadu in the Chittoor District. It has thirty one heavy leaves strung together on a heavy ring the ends of which are soldered to a huge seal bearing the royal insignia of the Cholas. The first ten plates bear writing in the Grantha script and in Sanskrit language and the remaining twenty one plates contain writing in Tamil script and language. The charter was used during the time of the great Chola king called Rajendra I and it records in great detail the grant of land to the Siva temple at Tiruvelangadu.

Specimens representing sculpture, etc., are displayed in the various galleries of the archaeological section. They have to be seen in the following order.

To the right side of the turnstile is the flight of steps leading upstairs. At the head of the stairs is the passage where plaster casts of coins are shown. The hall adjacent to this is devoted to

the antiquities from Harappa and Mohenjo-daro (see chapter on Anthropology for details regarding the culture of Harappa). At the end of the passage on the wall opposite the wall show cases containing records of the British East India Company is a show case where a representative collection of terra-cotta figurines belong to period such as the pre-Mauryan, Mauryan, Sunga, Kushan, and Gupta. Of these the specimens of terra-cottas belonging to pre-Mauryan times are of interest because, as has been mentioned above, very few antiquities belonging to periods earlier than the Mauryan period have been met with and the figurines, though fragmentary in nature, show clearly the high watermark of development of the artistic activities of the people of those times. A technical point to be noted here is that upto about the 2nd century B. C. the terra-cotta figurines were all hand-made. The specimens of terra-cotta belonging to other periods are also of interest in that while they display more or less the same details as are found in the stone or metal sculptures of the respective periods, being partly made by hand and partly taken from moulds each specimen has a distinctive artistic flavour about it. Noteworthy features of these figurines are the head-dress and the jewellery. Their modelling is also no doubt excellent. During the Gupta period the figurines came to be produced from moulds.

Beyond this passage, there are five bays on the left wing of the mezzanine floor. Here in each bay are displayed specimens of sculpture and architectural pieces belonging to important periods of the early history of North India.

A word as to why they are shown here is necessary. Though the Museum is primarily a show room for antiquities belonging to South India in particular as the history of Indian Culture is one and indivisible and as the early periods of South Indian history are not represented by any tangible antiquities, a few antiquities or a casts of very important antiquities of early periods of North Indian history are shown here so as to give the visitor a proper perspective of Indian culture. A study of these, coupled with the study of the protohistoric cultures of Mohenjodaro and Harappa will help a visitor to the Museum a more or less complete and panoramic vista of the cultural and social activities of the people of ancient India. In each bay, the actual specimens are supplemented by photographic enlargements of a few other very important land marks of the respective periods.

The very first bay here is devoted to the Maurya and Sunga periods. The huge figure representing a chauri-bearer is a good specimen of Mauryan sculpture in the round. All works of art in stone of Mauryan times bear a high glossy surface. This piece too possesses this lustre. This is only a plaster cast. The original figure now belongs to the National Museum, New Delhi. There are here two other plaster casts of two bas-relief sculptures occurring in a very early rock-cut cave at Bhaja, a village near Bombay. The cave is dated to about the beginning of the 2nd century B.C. Then there are a few pieces of the railing of the stupa which stood at Bharhut. The stupa belonged to the Sunga period and its date was about the middle of the 2nd century B.C.

The next bay is devoted to the specimens of sculpture belonging to the period from 0 to 300 A.D. They are of the indigenous school as was practised at Mathura. Here the figures of salabhanjikas (Fig 3) and the heads of the Buddha are noteworthy. The chief characteristic of the sculpture of this school is to emphasise expression of spiritual force rather than delineation of the anatomical features faithfully. The subjects dealt with are mostly Buddhist in character.

In contrast to the above technique employed by the above school, is that of the school of Gandhara specimens of which are displayed in the next bay. Though the themes are entirely Buddhist, the manner of depiction has been western. This school was manned by artists and sculptors steeped in the traditions of the art of Greco-Roman schools. A distinctive feature of these specimens is that here perfection of human form was arrived at as it was in the classical sculptures of Athens and Rome. The other distinguishing characteristics of these sculptures are heavily folded drapery, square face, muscular body and the decorative halo seen behind the head of a Buddha or a Bodhisattva. The best examples of this school were produced during the heyday of the Kushans, i.e., in the 2nd century A. D. It is said that it was this Gandharan school which fashioned the Buddha in human form for the first time, although there is evidence enough to show that at about the same time the indigenous sculptors of Mathura had also produced sculptures representing the Buddha as an ascetic according to the textual descriptions of an ideal ascetic. The school of Gandhara continued to exist till about 500 A. D. During its later phase it produced sculptures in stucco which are reputed for their beauty. A good number

of Gandharan sculptures are on show in the Indian Museum, Calcutta, but the best collection of Gandharan sculptures is to be found in the Lahore Museum.

In the next bay are shown specimens of sculptures of North India belonging the Gupta period. It lasted from the early 4th century A. D. to about 600 A. D. This period is acclaimed as the Golden Age owing to the remarkable cultural efflorescence of the times. In every walk of life some noble innovations were created. People of all creeds and religions lived together amicably. Mints of the time produced gold coins of exquisite design bearing on both sides wonderfully wrought figures of kings and goddesses. Literateurs like Kalidasa lived then. Architects and sculptors of no mean order lived then and produced beautiful temples and sculptures. A gem of a temple of this period is the one at Deogarh. Fine examples of sculptures of the period were produced at Sarnath and Udayagiri. The famous Buddha in the Dharmachakrapravartanamudra is from Sarnath and the Deogarh reliefs representing Seshasayin, Naranarayana and Gajendramoksha are justly renowned as exquisite specimens of plastic art. In the bay devoted to Gupta sculptures, a number of specimens from Sarnath are shown. Of them the standing Buddha is noteworthy.

Just about the time when the Guptas were ruling over North India, Central India was under the rule of another important royal Dynasty called the Vakatakas who were related to the Guptas by matrimonial alliances. The famous rock-cut caves and mural paintings of Ajanta on their existence to the kings of this dynasty, not to the Gupta kings as was believed till recently. Besides the world renowned paintings, the caves at Ajanta also possess a wealth of sculptures. A plaster cast of a Nagaraja from among the sculptures of Ajanta is also shown in this bay. The bloom established by the Guptas in the various fields was continued for a long time by the people of the subsequent periods in North India.

Orissa, ancient country of Kalinga saw the highly refined cultural activities since at least the 2nd century B. C. During the mediaval periods, the people of this country were suffused with ideas of ennobling nature which made them produce marvellous monuments of architecture and sculpture. A number of such examples of the arts may be found at a single town itself namely Bhubaneswar. But the temples at Konarak and Puri are also famous for their architectural and sculptural wealth. A few specimens of sculpture of this virile school are shown here. This school is the only school of sculpture

of ancient India which specialised with remarkable success in producing secular figures possessing absorbing artistic excellence. A couple of small sculptures representing women are also shown here. The manner of hairdressing and the posture of these figures are especially noteworthy.

In the opposite wing of the mezzanine floor, the first bay is devoted to sculptures of the Pala and Sena schools. Among them the dancing Ganesa and the Vishnu are noteworthy.

The next four bays are devoted to showing the evolution of the scripts of South India illustrated by a chart, a few original inscriptions on stone, plaster casts of a few copper-plate inscriptions and a cast of the Asokan inscription from Jangada. The scripts, the evolution of which are traced here are Nagari, Grantha-Tamil, Canarese Telugu and Brahmi.

Descending through the staircase at the end of this wing, the visitor will find on the ground floor in the passage the turnstile a series of photographic enlargements of temples of South India arranged in chronological order so as to illustrate the evolution of the architecture of South Indian temples.

The visitor will now enter the main hall of the New Extension where monumental sculptures of South India are shown on either side arranged in a chronological order (Fig 4). On the left side are shown sculptures belonging to the various periods of the history of Tamilnad. On the right side are shown sculptures belonging to various periods of the history of the Andhra Karnataka region.

In the first bay on left side are displayed sculptures belonging to the Pallava period i.e. from 600 A.D. to 850 A.D. Here are a magnificent Vishnu, a Ganesa with four hands, a bas-relief composition and a beautiful horned Dvarapalaka (Fig 5). These are characterised by powerfully moulded bodies, naturalistic features and sparseness of ornamentation. The Vishnu figure exemplifies all these characteristics in a remarkable manner.

The Pallavas were succeeded by the Cholas about the middle of the 9th century A. D. and the latter were supremely powerful for over four centuries. The Chola period is therefore divided into two parts, early and later. During the early Chola period arts and literature reached the height of

their development while in the later Chola period, the traditions of the earlier period were continued with but slight changes. Specimens of sculpture of the early Chola period are shown in the next bay. Among them the most noteworthy are the superb shanmukha (unfortunately badly mutilated), the Ardhanarisvara from Tiruchchinnampundi (Fig 6) the Dakshinamurti from Cholamaligai and the group of Tripurantaka and Tripurasundari from Kodumbalur (Fig 7) which is dated to about the middle of the 10th century A. D. and Virabhadra from Tiruchchengattangudi (Fig 8). The sculptures of this period are noted for their idealisation of human form and refinement of the decorative details. Consequently, the sculptures of this period are finer and the portrait sculptures are depicted in a variety of beautiful postures.

The sculptures of the later Chola period which ended about 1300 A. D. are shown in the next bay. As has been said above, these are distinguished by slight stylisation and elaboration of decorative details. The sculpture showing Ranganatha with Sridevi and Bhudevi is a typical example of this period. The refinement and classicism of the earlier period may be found to be continued in the sculpture of Bhikohatana.

After the Cholas, the whole of South India came under the rule of the emperors of Vijayanagar (Hampi). They were reputed for their devotion and so were engaged in building new temples and in adding lofty gopuras to such sacred temples as the Nataraja temple of Chidambaram and the Arunachalesvara temple of Tiruvannamalai. The new temples built by them are to be found at Hampi itself. Though these kings lavished their wealth on building such magnificent edifices as mandapas and gopuras, the sculptors and artists of their period worked in their own way probably caring more for pomposity than for artistic excellence, with the result the sculptures of this period attained momental proportions and possessed vigour and excessive embellishments only. The sculptures shown in the Vijayanagar bay bear out these remarks clearly. It is evident in the Bhikshatana and the seated Vishnu figures. An interesting piece of sculpture in this bay is the bas-relief showing the emblem of the Vijayanagar dynasty. The Vijayanagar period ended about 1600 A. D.

The next bay is devoted to sculptures of the modern period i.e. the period after 1600 A. D. These sculptures are

perfect in so far as their iconography is concerned. But in other respects they are very poor specimens of the art.

Retracing the steps and coming to the first bay of the opposite side, there are a few interesting specimens of sculpture belonging to the early Chalukyan period (6th to 9th century A. D.) The huge two-handed Ganesa shown here is from Bezwada as also the two huge dvarapalakas and two elephants shown on either side of the flight of steps at the other end of the New Extension. Though these are monumental in size, their exquisite workmanship is apparent in every one of their limbs. This is clearly seen not only in the dvarapalakas but also in the Ganesa, all of which are intended to be seen from a distance. An interesting sculpture of eight handed Sarasvati in dancing posture finds a place here.

In the next bay sculptures belonging to the period from about 850 A. D. to 1100 A. D. when the Nolambas were powerful in and around Bellary and Anantapur districts are shown. Among these, the Vinadhara Dakshinamurti, (Fig 9) the Uma-sahitamurtis and the Natesa are splendid ones.

In next bay are exhibited beautiful specimens of sculpture belonging to the Hoysala-Kakatiya period. The intricately but beautifully worked gateway (about 11th century A. D.), the badly mutilated figure of a goddess within the gateway, the Kubera of the early Hoysala period and the Saptamatrika sculpture are noteworthy here.

In the next bay specimens of sculpture of the Vijayanagar period from the Hampi and other places in the Andhra-Karnataka region are displayed. Here the elephant, the sage and the reliefs occurring on the parts of temple basements are interesting for their realistic character.

The next bay on this side shows sculptures of the Modern period from Andhradesa. Though in the Vijayanagar period, the style of the art of this country was influenced to a great extent by the traditions of the art of Tamilnad, as soon as the empire of Vijayanagar was destroyed, the people reverted to older indigenous style in the sculptures displayed here and therefore in this characteristic local style.

Going up the central flight of steps, the visitor stands face to face with a magnificent sculpture of Surya of the Pallava Chola transitional period standing erect in a niche specially provided for it.

To its left at one end of the passage are kept a few sculptures of snake-stones. Of these the one with multiple knots and with a reef knot in the centre is specially noteworthy.

Returning and passing by the Surya sculpture, the long passage which leads on to the Hindu Sculpture gallery beyond, is devoted to a select series of memorial stones and hero-stones. These bear sculptures of crude workmanship and are as a rule inscribed. From the inscriptions the details regarding the persons for whom the memorial was erected are known. Usually these monuments were erected in memory of persons who had sacrificed their lives while attempting to rescue the cattle of their village from the attack of wild animals. Some of the memorial stones date back to the late Pallava times.

In this gallery is shown a Sati stone also. Sati stones were erected in memory of the woman who burnt herself on the funeral pyre of her husband. The person committing the Sati was believed to join her dead husband in the other world where both were said to live eternally together in perfect happiness.

Beyond this is the Hindu Sculpture Gallery where Hindu Sculptures of various periods and localities are shown. Besides, a series of architectural pieces are also shown here and these are arranged so as to illustrate the evolution of motifs such as corbel, kulu and base of a temple through the ages. The sculptures are displayed. On either portion of the platform in which the architecture parts are kept. The portion immediately adjoining the Memorial Sculpture Gallery contains specimens of Hindu Sculpture of the Tamilian schools while the corresponding portion on the opposite side contains sculptures of the Andhra-Karnataka schools.

The most important among the Tamilian sculptures are those obtained from Kaverippakkam and Satyamangalam. The Kaverippakkam sculptures date from about 850 A.D. A great majority of sculptures from Kaverippakkam consist of Siva Ganas in a variety of amusing postures. There are also other very interesting sculptures from Kaverippakkam like the beautiful Brahma Gajalakshmi and Lakshmi in the symbolic form of *svastika*. The sculptures from Satyamangalam represent Saptamatrikas (Fig 10.) and their date is about the 8th century A.D. Other noteworthy specimens of sculptures included in this part of the gallery are the unique Vayu and Agni figures of early Chola period from Tirunelveli, the seated Ardhanarisvara

figure from Mahabalipuram the beautiful seated Vishnu in alto-relievo of late Pallava period shown against the wall and the seated Siva of late Pallava period fixed in front of the above Vishnu.

In the portion where further sculptures from the Andhra-Karnataka region are shown, there are a few interesting specimens too. They include the huge Chamunda with a terrifying countenance, the bas relief sculptures carved on the two pillars from Hemavati, the Ganesa and the Devadampati (Rama and Sita) (Fig. 11). In this part of the gallery, along the walls, we have displayed models in plaster of Paris of South Indian temples. Recently a scale model in plaster of Paris of the great stupa of Sanchi was added to this gallery. Besides, a few pith models of the Big temple of Tanjore etc. are exhibited in this section of the gallery.

Buddhist Sculpture Gallery: Adjoining the Hindu Sculpture gallery, is the Buddhist sculpture gallery. It houses some of the earliest specimens of the art of sculpture, architecture and writing. These include a part of the world famous sculptures from Amaravati, a few sculptures from Jaggayyapeta some of which are most probably the earliest existing sculptures of South India dating from about 200 B.C. and a few stray pieces from places like Ghantasala. Almost the whole collection of early sculptures come from Andhradesa. Nevertheless, a few huge sculptures in stone belonging to late mediæval periods of Tamilnad are also displayed here.

Most remarkable amongst the exhibits of this gallery are the three stone relic caskets from Bhattiprolu. Each of them consists of a receptacle with a lid. Both of these are inscribed in Southern Brahmi characters of about 200 B.C. Perhaps these are the earliest known example of the art writing of South India. These caskets were found one below the other when the ruined Buddhist stupa at Bhattiprolu was uncovered. These caskets contained each a small crystal casket. Each of the crystal caskets contained a few fragments of bone and a few gold flowers, beads of gold, semi precious stones and a few small lead coins. The bone relic was given away to the Mahabodhi Society of Calcutta while the other antiquities are kept in the reserve collection. The workmanship of the crystal reliquaries is superb. Two of the three are in stupa form and the third is circular in shape. They clearly prove that the craftsman of South India of the 3rd century B. C. was an adept in lathing, carving, designing and polishing. Indeed these antiquities are priceless.

The next group of antiquities exhibited in this gallery are from Jaggayyapeta. It consists mostly of sculptures of Buddhism. They are next in important only to the Bhattiprolu relics. The two world famous sculptures among them are the one which represents Chakravarti Mandhata and the other which represents an oblong shrine (*Punyasala*) with a wagon shaped roof.

The remaining items in this gallery are the sculptures from Amaravati (Fig 10). They belonged to a Buddhist stupa of the place. The place was the capital of the early Andhra kings. It was originally known by the name of Dhanyakataka. The stupa was begun about 200 B. C. and completed about 250 A. D. It stood as a colossus with a height of about 100 feet and diameter of about 192 feet. It was embellished all over with slabs bearing beautiful bas-reliefs illustrating stories from the life of the Buddha and the Jatakas. The material used is a variety of lime stone.

In view of the fact that monument was neither a work of a single period, nor of a single hand, the sculptures show naturally variations in their workmanship. On stylistic grounds, the sculptures are divided into four groups. The first group of sculptures belong to the period upto about 100 B. C. They are only few in number. Amongst them may be mentioned the Man and Boy, the Sri on lotus on a coping stone and the bas-relief sculptures carved on a short pillar. The characteristics of these early sculptures are akin to those of the sculptures from Bharhut. This is evident especially in the head dresses, ornaments clothing and in the modelling of the figures, which is archaic.

The second group of sculptures belong to the period from 100 B. C. to 100 A. D. They include large slabs having representations of stupa-worship, Buddha-worship and Bodhi-tree worship. Several of them are also inscribed. The characters of these inscriptions give us an idea about the date of the sculptures.

The sculptures belonging to the third group are by far the largest in number. Most of them are parts of the huge railing put up during the middle of the 2nd century A. D. It is said that Nagarjuna Acharya the great Madhyarnika teacher was responsible for this. It is in these sculptures that one can see the perfection of the art of sculpture of ancient South India. The railing was about 14 feet high and consisted of pillars, cross-bars

and coping stones. All these parts are carved both sides. The sculptured portion on the outside shows chiefly garlands borne by yakshas, on the coping stone and half and full lotus medallions on the pillars and cross-bars. The manner in which the garland motif is executed is remarkable. The garland which is shown in a beautifully undulating way, together with its bearers, the yakshas, who are shown as if gracefully gliding produces in one the illusion that the whole piece is moving in a rhythmic manner. Though the lotuses of the medallions are stylised their patterns, especially their borders are beautiful.

It is the sculptures on the inner face of the railing that are interesting in many ways. They depict scenes from the life of the Buddha. Several stories from the Jatakas are also carved here. Amongst the bas-relief representing stories from the life of the Buddha, the one occurring on a cross-bar showing the subjugation of the mad elephant called Nalagiri (Fig 11) the other carved on a piece of coping stone showing the Maras attack and the coping stone where the division of the relics of the Buddha (Fig 14) is represented are a few very interesting ones. The panel sculpture of women adoring Buddha suggested by throne and feet is also note worthy (Fig 15) Among the panels showing Jataka stories, the one on a coping representing Kavikumaravadana, the other on a cross bar showing Sibi Jataka, the third occurring in a coping stone showing Vidhura pandita jataka and the fourth occurring on a cross-bar showing the six tusked elephant story are noteworthy.

The chief characteristics of these sculptures are varying depths of relief of individual items of a particular panel, the crowding of a panel with a number of men, animals and vehicles. Despite such crowding the sculptors of these pieces had obviously taken care to show every one of the details clearly and to adjust and balance the items as beautifully as possible.

The fourth group of sculptures belong to the first half of the 3rd century A. D. They include casing slabs with miniature stupas carved on them, friezes showing Buddhas and stupas, a pair of standing Buddhas and friezes with sculptures in miniature size showing scenes from the life of the Buddha and jataka stories. Among the casing-slabs, the most remarkable is the huge one which has been fortunately well preserved. It bears a miniature stupa which is carved with such fidelity to the prototype that every part of the prototype is faithfully reproduced. In fact it is from this representation of a stupa.

that it is possible to have an idea of the original stupa. So, this piece of sculpture is amongst the most valuable and interesting items of the entire collection. The figure of a yakshi inside a Kudu (Fig 16) is of great interest.

Since the original stupa was utterly ruined, its shape and dimensions could not be precisely known. In order, however, to give the people an idea of the stupa a conjectural model of it in plaster of Paris has been made. It is exhibited at the beginning of the gallery.

The stupa of Amaravati was in all its glory in the 7th century A. D. when Hiuen-Tsang visited it. It seems to have continued in that state for some more centuries. Since the 12th century it was neglected and began to be covered with earth. Its importance was known only in the 19th century when a number of sculptures of this stupa were sent to England where they are now in the British Museum. All that remained over has been brought under the roof of the Museum and arranged in this gallery. Since then these sculptures have become the cynosure for the visitors and the collection as a whole has become the pride of the Museum. It may be mentioned here that if the monument had stood in its original glory, it would indeed be one of the most beautiful monuments of the East.

Opposite this model in a corner is seen a huge standing Buddha made of granite (Fig 17). It is larger than life-size and has very strong features. Its modelling is very powerful. It may be assigned to the 7th century A. D. It was found in the Sri Kamakshi Amman temple of Kanchipuram. Its provenance and date suggest that during those early periods Buddhism was very strong at Kanchipuram.

There are also a couple of big stone Buddhas in this gallery. One of them comes from Kuram and the other from a village in the Tanjore District. They are late figures and so comparatively of little artistic merit. The plaster cast of the famous Buddha from Mathura has recently been added to this gallery (Fig 18).

There is one more group of Buddhist sculptures which are exhibited at one end of the Centenary Exhibition Hall and in a corner of the Hindu Sculpture gallery adjoining the Amaravati sculpture gallery. These sculptures come from a village called Goli in the Guntur District. From their style they are dated to the 3rd century A. D. That is, they belong to the period when

the sculptures of the last phase of the Amaravati school were produced. Hence between these two groups, there is much that is common both in style and decorative details. The Goli sculptures include a large bas-relief showing the Bodhisattva, another large bas-relief showing a stupa and a number of long friezes. The sculpture on one of the friezes is superb. It represents the famous theme of Vessantara jataka. Here are shown the king and queen, prince and princesses, men and women, animals and carts, palaces and huts, all executed in a highly realistic manner. Among other sculptures those depicting Sesa Jataka and Motiposaka jataka are worth mentioning.

Retracing one's steps and passing through the portion of the Buddhist sculpture gallery where the Bhattiprolu relic caskets are kept, one may enter the adjoining room—the Jain sculpture gallery. South India has been an important centre of Jainism as well as Buddhism. The history of Jainism of South India dates back to the 4th-3rd century B. C. The sect that has been in vogue here since ancient times is that of the Digambaras. They are said to follow the orthodox form of the religion and they are also very austere in their ways of living. Accordingly the sculptures produced by them bear the stamp of austerity and uniformity. Most of them are representations of the Tirthankaras of the religion. Of them, Parsvanatha and Mahavira are the most popular. But the collection of Jain sculptures of this Museum includes figures of other Tirthankaras also like Padmaprabha, Pushpadanta and Suparsvanatha. Among the whole group, the sculptures obtained from Danavulapadu in the Cuddappah District are interesting. They include a set of early sculptures dating from the 9th-10th centuries. These include a huge Parsvanatha (fig 19), a Yakshi, two Chaumukhs and an inscribed pillar with three panels of paintings. There is another set of sculptures belonging to a later period, which are mainly tombstones or *nishidikas* (fig 20). Besides these, there is a beautiful bas-relief showing Mahavira which is dated to the Pallava period. It was found at Deviagaram. The huge seated Tirthankara figure from Tuticorin (fig 21) is also of interest not only because of its size but also because of its provenance. It shows that Jainism was vigorously practised by the people of the southern Pandyan country, upto late medieval times. Just in front of this big statue, are shown a few standing Tirthankara figures some of which are also inscribed. They are made of black granite and polished well. On grounds of style they may be said to come from South Kanara.

These Jain sculptures are as a rule stiff and very little variety is met with in the representation of the themes nor is there any scope for displaying the capacity of the sculptors because the subjects dealt with are mostly Tirthankaras either seated or standing. On the floor above the adjoining Geology gallery are exhibited the reproductions of some of the most famous Indian and a few Ceylonese paintings the originals of a few mughal miniatures and paintings of the Tanjore and modern schools. The most notable ones are the painting from Sigeria, Parvati from Panamalai (Fig 22) the Lotus pond at Sittannavasal and the scene of Siva's fight with the demons at Tanjore.

The cream of the museum's collections, viz. The South Indian bronzes are exhibited in the newly opened Bronze gallery. The collection of bronzes of South India of this Museum is justly famous all over the world. About 400 specimens of them are on show. Another 600 specimens of the art are kept in reserve collection. Rarely do we find such a large collection of metal figures under a single roof. They are important not only quantitatively but also qualitatively. They are divided into categories on the sectarian basis, namely Saivite and Vaishnavite. Each group of bronzes are displayed in separate rows and are arranged according to iconography. Amongst the bronzes of the Saivite group the most famous are the Natarajas. Similarly the most interesting amongst the Vaishnavite bronzes are the two groups of images representing Rama, Sita, Lakshmana and Hanuman and Vishnu with Sridevi and Bhudevi. Recently an excellent Ardhhanarisvara bronze was received as a treasure trove find from Tiruvenkadu village, Shiyali Taluk, Tanjore District (Fig 23). This is an elegant bronze and its interest is all the more great, for it bears inscriptional reference in the temple. It is stated that the image was set up by Tipayana Uttama Chola, during the period of Rajadhiraja I (1047 A.D.). Another graceful figure of Chandesvara (Fig 24) was also unearthed at the same village and also exhibited in the same gallery.

Since the Natarajas are very popular with the visitors, the best Natarajas are exhibited on pedestals and in separate show cases. Of these the most remarkable are the Nataraja from Velanganni dated to the 10th century A.D. and the Nataraja from Tiruvelangadu (Fig 25) dated to the 11th century A.D. The latter bronze is now removed to the National Art Gallery, Madras. There is also a unique Nataraja in the leg-reversed posture obtained from Poruppumattuppatti of the Tirumangalam taluk in the Madurai District dated to about

900 A.D. The Nataraja from Belur is important as it bears a dated inscription on its pedestal. Besides these Natarajas, a group of Varadaraja with Sridevi and Bhudevi of large size is also exhibited in this section.

Among the other Saivite bronzes the little Somaskanda from Tiruvelangadu and the remarkable Vishvapaharana from Kilapudanur both of the late Pallava period, the Vinadhara Dakshina-murti from Pudur, (Fig 26) the Kali from Senniyanvududi and the smaller Kannappanayanar all of the Chola period and the Dancing Ganesa and the larger Kannappanayanar both of the late Vijayanagar period are of great interest. Besides, there are displayed in this gallery a few small crude-looking bronzes also. They represent gramadevatas like Karuppan. They are interesting from the point of their folk style and the technique employed in making them.

Among the Vaishnavite bronzes the small Vishnu from Adikudi (Fig 27) is of great interest. The beautiful group of Rama from Vadakkuppanaiyur (Fig 28) which has since 1951 been transferred from the Vaishnavite bronze gallery to the National Art Gallery, Madras is dated to about the 10th century A.D. In the images of this set one can see the South Indian sthapati at his best. Every one of the bronzes of this group is perfect in modelling, beautiful in its stance and tasteful in its decoration. In short they are exquisite specimens of the art. Another Rama and Sita alone of a group have been acquired from Manakkal and are displayed in the gallery. Recently another Rama group has been got from Tiruvalangadu in the Tanjore District (Fig 29). All the images of this set are worked minutely and elaborately and they are good specimens of the art of the late Chola times. Among the other bronzes of this section, the Vishnu with Sridevi and Bhudevi from Peruntottam is easily the best. Though smaller than the Rama groups mentioned above, the bronzes of this Vishnu set are noted for excellence of workmanship and beauty of modelling. The big Kaliyakrishna and the Tirumangai Alvar are some of the other best pieces in the Museum collection.

Nearly all the bronzes of this Museum come from Tamilnad. There are, however, an insignificant number of bronzes from Andhradesa. Among these there are two interesting groups of Venugopala with Rukmini and Satyabhama (Fig 30). They come from Chimakurti and they are beautiful example of the art as obtained during the early Vijayanagar period.

Besides these Hindu bronzes, a very important collection of Buddhist and Jain bronzes is also on show in this gallery. The Buddhist bronzes come from two places, namely Amaravati and Nagapattinam. The bronzes from Amaravati are only four in number but their date is 5th - 6th century A.D. Hence until now these bronzes from Amaravati are the earliest examples of the art of India. Coming as they do from a famous Buddhist site, they also represent Buddha. Of these the large standing Buddha is noteworthy.

The remaining Buddhist bronzes numbering over seventy come from Nagapattinam. In fact they are the picked specimens selected from over three hundred and fifty bronzes discovered at the place. The range in date from the late Pallava times (i.e. from the end of the 9th century A.D.) to the 17th century A.D. The existence of bronzes of different dates shows unmistakably the popularity of the religion with the people of the locality, through the centuries. Among them the most interesting are two large standing Buddhas of beautiful workmanship, dated to the 10th century A.D., a large Maitreya of the late Chola period, a fine Simhanada Avalokitesvara seated in the *maharajalila* pose (Fig 31) and a very charming Tara of early Chola period.

Along with these is exhibited a solid copper gilt Maitreya of about the 10th century A.D. got from Melayur in the Shiyali Taluk of the Tanjore District. It is unfortunately mutilated. Yet it is unsurpassed for the beauty of modelling and delicacy of decorative details. That gilding of metal articles was well known to the sthapatis of those early times is another interesting information known from this.

The last but not the least important among the items of bronzes to be noticed here are the Jain bronzes. Four of them are on show. They represent Tirthankaras like Adinatha and Mahavira. They may be assigned to the 11th-12th centuries A.D. They come from the Bellary District. Unlike the Venugopala bronzes from Chimakurti, these Jain Tirthankaras are classical in style. It is probably due to the fact that here in the Bellary area the traditions of the art of sculpture of the earlier Western Chalukyan times were lingering for a long time and these bronzes are the products of the last phase of this style, the sculptures of the later periods being strongly influenced by the Hoysala school. The bronzes of Mahavira from Singanikkuppam in the South Arcot District (Fig. 32) and Sivaganga in Ramanathapuram District (Fig. 33) are noteworthy.

Apart from those on show, as has been said above, a large collection of bronzes is kept in reserve. They include images of all the three religions. Among Hindu bronzes in the reserve collection mention may be made of the Ayudhapurushas representing Kaumodaki and Sudarsana, the gada and chakra respectively of Vishnu, and the group of Tripurantaka and Tripurasundari acquired recently. The Jain images of the reserve collection include an early Chola Tirthankara figure from Sivaganga in the Pandyan territory and a group of Mahavira, Ambika Yakshi and another Mahavira all of later chola date acquired from Siganikuppam village in the South Arcot District. The big Mahavira of this group is the largest one of its kind acquired so far. The bronze Ambika of this group is similar in all respects to a Parvati of later Chola period but with this difference namely in the crown of this figure there is a seated Jina figure and the Yakshi is attended by a maid holding a garland of flowers of exquisite finish and a male baby who resembles in every respect the Skanda of Somaskanda groups. The modelling of the ornaments and the bhanga of the Ambika are charmingly exquisite.

This large collection of bronzes does not contain many items dating earlier than late Pallava period. A great majority of them belong to the Chola period between 850 - 1300 A.D. and almost all of them come from Tamilnad. It is therefore clear that the traditions of this art were zealously guarded and put into wide use by the Tamilian sthapatis. It is the case even today. These were required for purposes of worship in temples as well as for taking them out in procession. When examined, no two bronzes will be found to be identical in details, even granting that they were made by one and the same sthapati. It is because of the fact that each item was made from a separate mould which was destroyed soon after the bronze figure was cast. The technical process by which they were cast is called the "lost-wax process". The details of the process is broadly as follows :

The theme is made in wax first. Then the wax model is coated with several layers of clay. After the clay has dried the wax core is drained off. Now the negative of the figure is in the hollow of the layers of clay. Then this hollow clay mould is heated to the requisite temperature. Through the hole made in this, molten bronze is poured. After cooling the mould is broken and there remains the cast. It is then chastened and the fine details of ornaments, etc. are carved. This process is an ancient one and even the people of Mohenjo-daro of 2000 B.C. seem to have

known this and employed it for producing bronzes such as the dancing woman. It is therefore of interest to know that it is the Tamilian sthapati who continues this millennia old tradition of metal image making.

In the gallery of minor arts in the nearby front building a great majority of exhibits are articles of metalware. While the potter's products were popular with the masses, their imitations in metal began to be made by sthapatins for use in temples as well as in the houses of the well-to-do. No doubt the earthenware pots and pans had their own artistic embellishments. But the decorative designs with which the articles of metalware came to be beautified surpassed both in beauty and in variety those met with in pottery. Even the very shapes of the different items of an independent category of articles are artistic.

Thus among lamps there are a number of groups such as hand lamps, standing lamps, hanging lamps and Dipalakshmis or women lamp-bearers. In each one of these groups distinct and independent types are observed. The Dipalakshmis are specially made by wealthy people for donating to temples. In the temples of Tamilnad one will come across them frequently. Among the standing lamps the most popular are the hamsa and the kinnari lamps. A special variety of standing lamps called in Tamil *kilai vilakku* (*dipa-vilaksha* in Sanskrit) with a number of branches from which hang down rows of lamps is an important item usually met with in temples. In large temples like the Madurai temple such lamps of huge dimensions may be found. In the collection of this Museum there are two such specimens, which are called wedding lamps.

The other categories of metalware articles are the trays including the Tanjore trays which have bas-reliefs in copper and silver on their inner side, utensils employed in the worship of a temple of South India, the articles of daily use like the *chellappeti* combs, collyrium box, ehunam box, nut cutters and so on; toys, bellmetal utensils in everyday use in a South Indian home and models of household utensils of the well to do people of Malabar.

A collection of Bidriware articles are also on show in this gallery, besides a representative collection of utensils used by Mohammedans of South India. The Bidriware articles are beautiful in their form and the designs on them.

At one end of the gallery are displayed a collection of Buddhist bronzes and utensils from Nepal and Tibet. The most interesting among them are the images of Lanka and Tara

and the Simla. A noteworthy feature of these articles is that they are made by the hollow-cast method, and they are gilt. The sculptures of Nepal and Tibet are characterised by atibhangas, slimness and excessive embellishments. These features are readily observed in the specimens in the Museum collection.

A small collection of specimens illustrating lacquer work is also on display in this gallery. They include a number of card-board discs with designs and figures done in lacquer, a few fans and a few containers. Besides these, two sets of ivory playing cards with designs done on them in lacquer are also exhibited here. These arts may be said to have disappeared for want of patronage.

Among other groups of articles in the gallery the two sets of porcelain ware and the collection of glazed pottery deserve special mention. The specimens of glazed pottery have been obtained from Karigiri where this kind of ceramic industry is flourishing to this day.

In the passage between the metalware gallery and the flight of steps are displayed two or three groups of wood carvings of temple cars. They may all belong to the last century. As usual each carving represents a deity of the Hindu pantheon. Besides these groups of carvings, a few stray carvings also find a place here. Among these are the Ravana from Ramanathapuram District and the pillars bearing at their bases beautiful carvings of women. A very old wooden pillar from Mudibidri in South Kanara District is also exhibited. It is a very interesting specimen of a pillar because it shows the vase and foliage capital and has small panels containing bas-relief representing Seshasayain Vishnu, etc. These remind one of pillars occurring in the caves of the Western Deccan, and it may therefore be said that this Mudibidri pillar is a distant echo of those cave pillars. Another set of four long friezes with several panels of carvings in them are displayed on the walls flanking the flight of steps. These were got from a temple at Quilon. The panels depict a continuous series of scenes from the Ramayana.

The most impressive of the collection of wood works are the two doorways displayed one on the first landing place of each of the two flights of steps. They are replicas of Mysore palace doorways and were purchased from the exhibition held in Delhi during the 1911 coronation. A large number of wood carvings are kept in reserve collection including an elegant Subramanya (Fig 34).

At one end of the passage where the wood carvings from temple cars are exhibited there are some fine specimens of ivory carvings. Among them the chess-men, the ink-bottle and the boxes are noteworthy. At the other end of the passage are shown, in a show case, a few exquisitely worked sandalwood carvings and half a dozen delicately and ingeniously carved coconut carvings.

Apart from these articles on show, a good number of interesting items under each category are kept in reserve. Among them the richest are the wood carvings which include a rare collection of twenty large carvings dating from the end of the 18th century A.D. got from the sixth temple at Kalaiyarkovil in the Ramanathapuram District.

Thus the archaeological collections of this Museum are rich both in quantity and in quality and the nation in general and the Madras State in particular can take pride in being heir to such a remarkable legacy of art treasures and valuable antiquities.

Owing to the richness and variety of these unique collections, the world of Indologists make it a point to get their doubts regarding any aspect of South Indian art and culture cleared by referring the matter to the authorities of the Museum and it is the avowed policy of the latter to help the scholars as far as possible. With a view to make the contents of the collection available for study for the scholars all over the world, the authorities of the Museum have been issuing bulletins on each group of exhibits and allied subjects. That these bulletins have served their purpose well is seen from the tremendous demand for it. Amongst these mention may be made of the *Catalogue of Hindu Metal Images in the Madras Museum* by Dr. F.H. Gravely and Mr. T. N. Ramachandran; *Amaravati Sculptures* by Mr. C. Sivaramamurti and *Guide to the Buddhist Antiquities* by Dr. A. Aiyappan and Mr. P. R. Srinivasan.

Another very important service rendered by the Museum in spreading the knowledge of South Indian bronzes is the preparation and sale to the public at low prices of picture post cards of a dozen select pieces of bronzes. These picture post cards have become so popular that it is difficult to cope with the demand. Photographic prints of all the exhibits are also made available to the public and though these prints are more expensive than the post cards they have been equally popular.

Recent Acquisitions to the Archaeology Section

I. Bronzes :

- (1) Vishnu, Thiruvonmangalam, Tanjore District.
- (2) Tripurantaka, Thirukkodikkaval, Tanjore District.
- (3) Vishnu, Thirukkannakkudi, Tanjore District.
- (4) Somaskanda, Pudukkudi, Tanjore District.
- (5) Krishna, Kalpattu, South Arcot District.
- (6) Tirumangai Alwar, Kalpattu, South Arcot District.

II. Stone Sculptures :

- (1) Buddha (Plaster cast model of the Buddha from Mathura).
- (2) Pillars of Pallava Mahendravarman, Kanchipuram, Chingleput District.
- (3) Buddha, Suthamalli, Trichy District.
- (4) Buddha, Tiruvalanjuli, Tanjore District.
- (5) Agastya, Tiruvalanjuli, Tanjore District.

III. Paintings :

Copies of the Mural paintings in the temples at Tiruvarur, Tanjore District; Srirangam, Trichy District; Chidambaram, South Arcot District; and Ramesvaram, Ramanathapuram District.

IV. Inscriptions :

- (1) A Pandya Copper plate of Veera Pandya from Sivakasi,
- (2) A slab with inscription in florid Pallava Grantha characters from Tandanthottam, Tanjore District.



FIG. 3. SALA BHANIKA

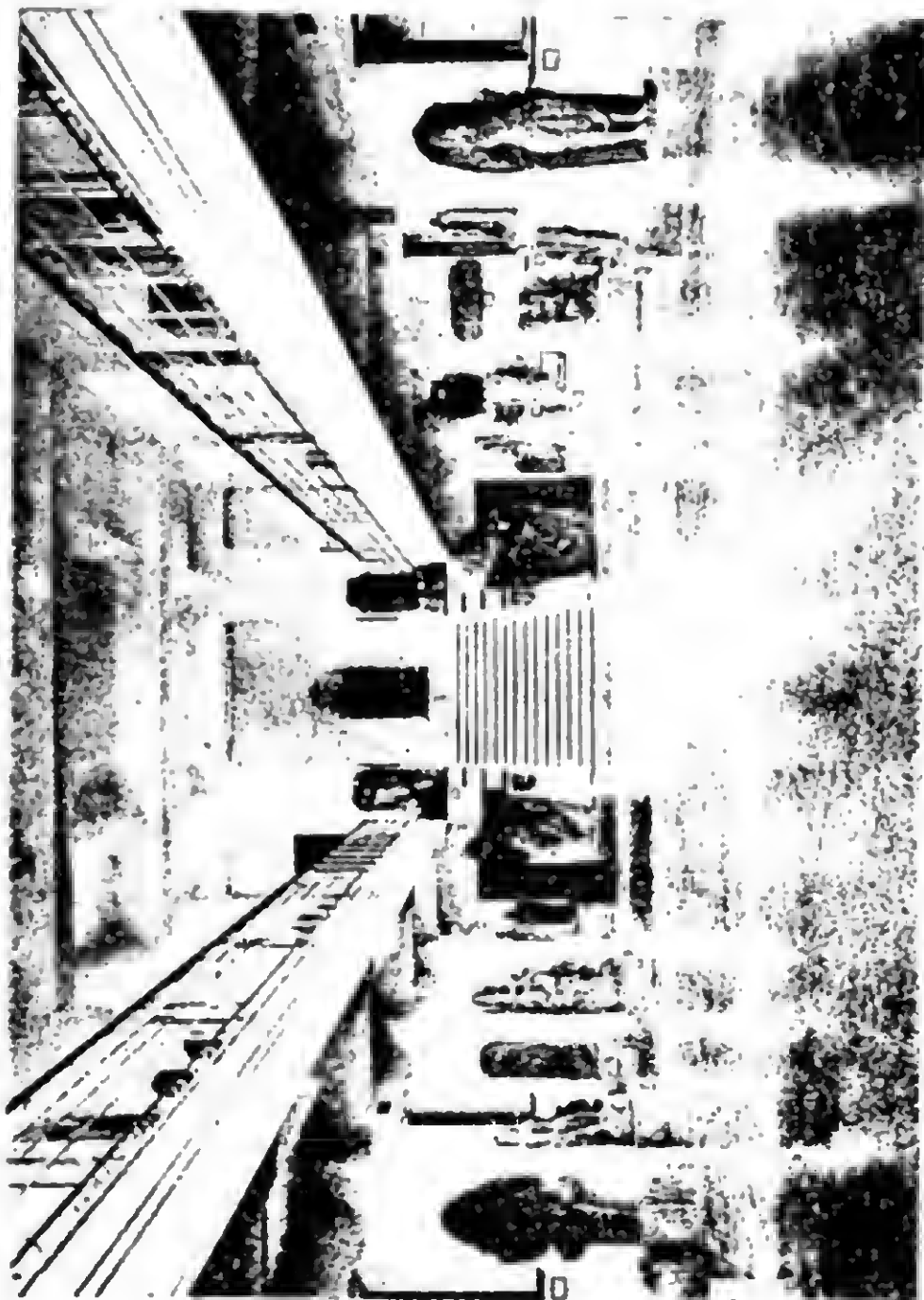


FIG. 4. ARCHAEOLOGICAL GALLERY. NEW EXTENSION BUILDING.



Fig. 3. HORNE DVARAPALAKA
Kaverippakkam. North Arcot Dt.



Fig. 6. ARDHANARISVARA
Tiruchchinnampundi, Tanjore Di

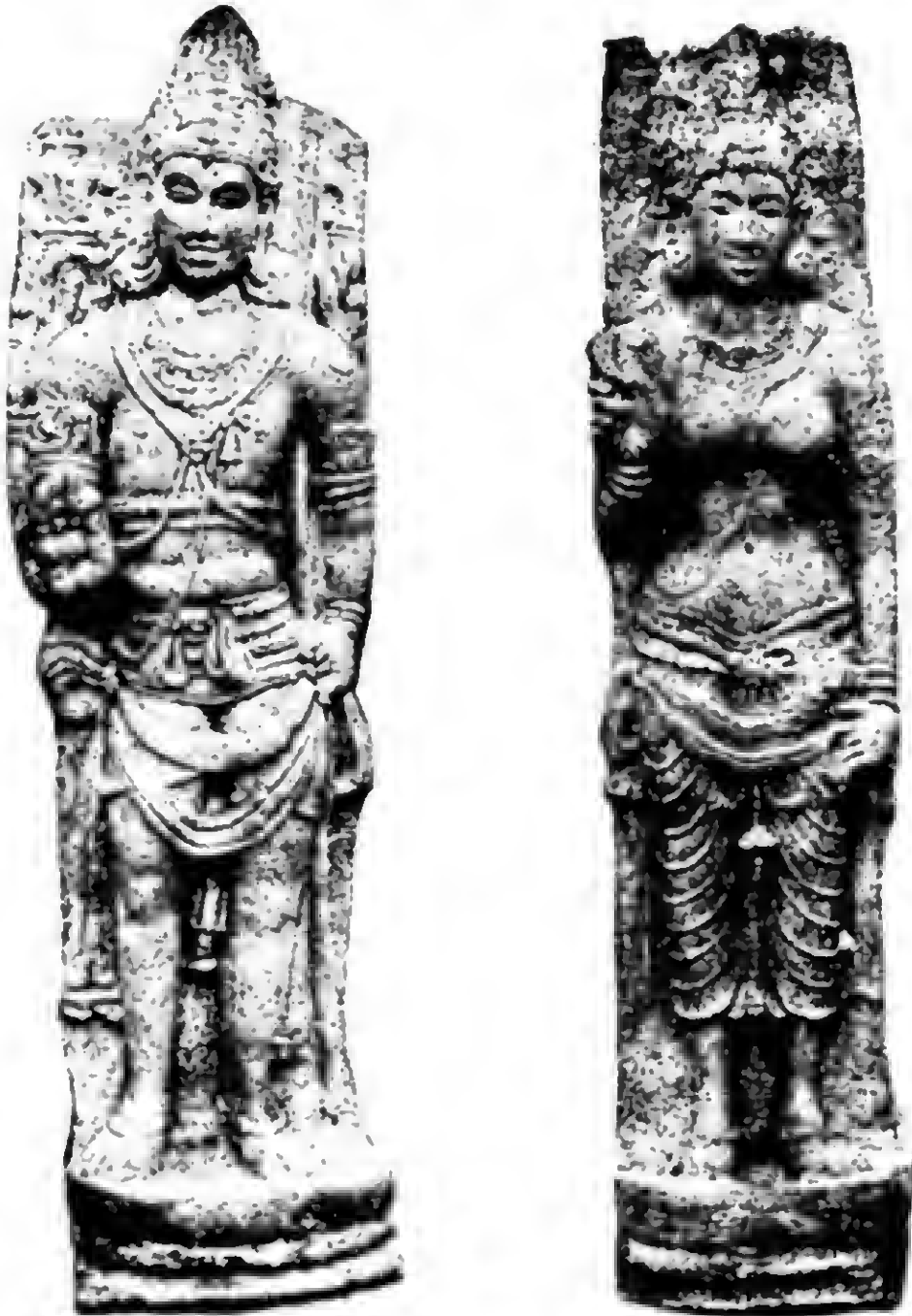


Fig. 7. TRIPURANTAKA AND TRIPURASUNDARI
Kodumbalur. Tiruchirappalli Dt.



Fig. 8. VIRABHADRA
Tiruchchengattangudi. Tanjore Dt.



Fig. 9. VINADHARA DAKSHINAMURTI
Hemavati, Anantapur Dt.

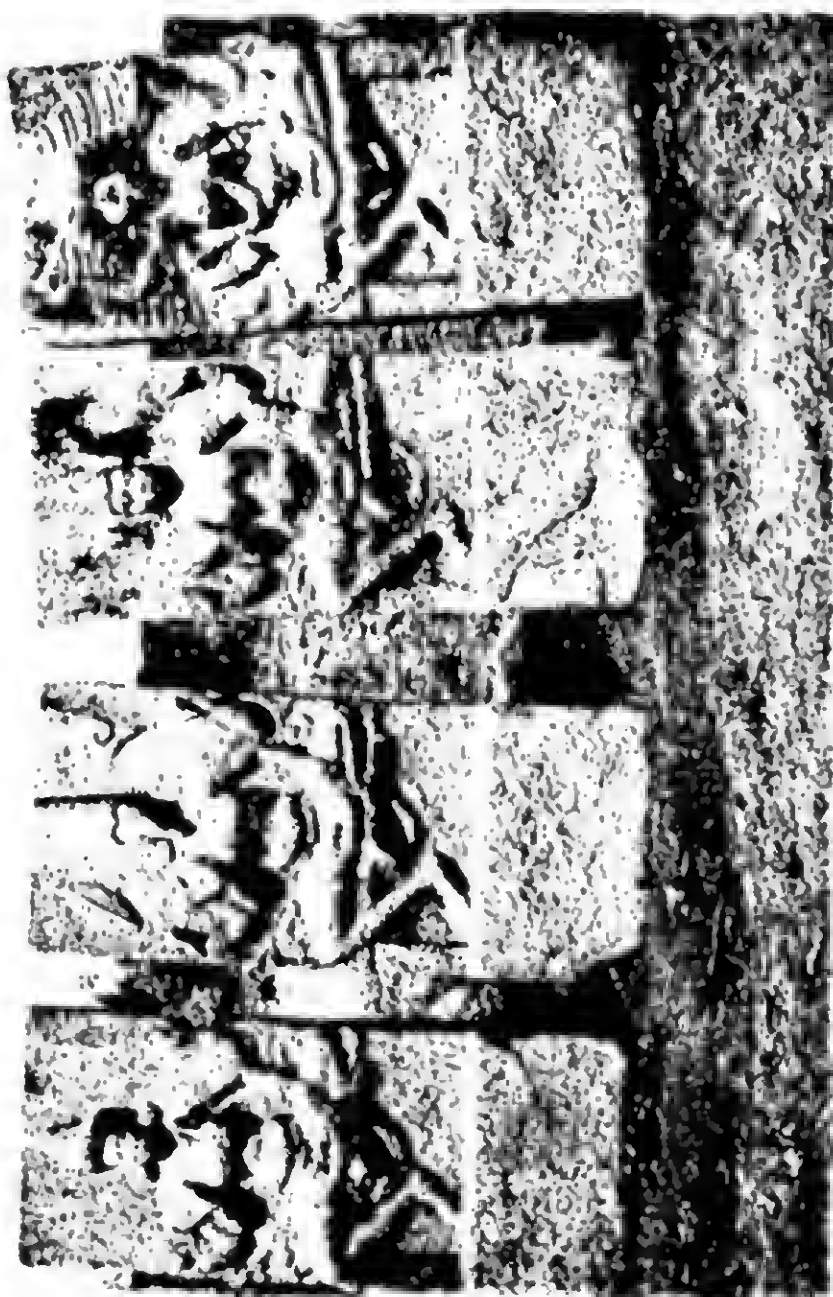


Fig. 10. SAPTAMATRIKAS
Kaverippakkam. N. Arcot Dist.



Fig. 11. DEVA DAMPATI (RAMA AND SITA?)

Hemavati, Anantapur Dist.



Fig. 12. AMARAVATI GALLERY -- A VIEW.



Fig. 13. SUBJUGATION OF NALAGIRI
Amaravati, Guntur Dist.



FIG. 14. DIVISION OF BUDDHA'S RELICS
Amaravati, Guntur Dt.

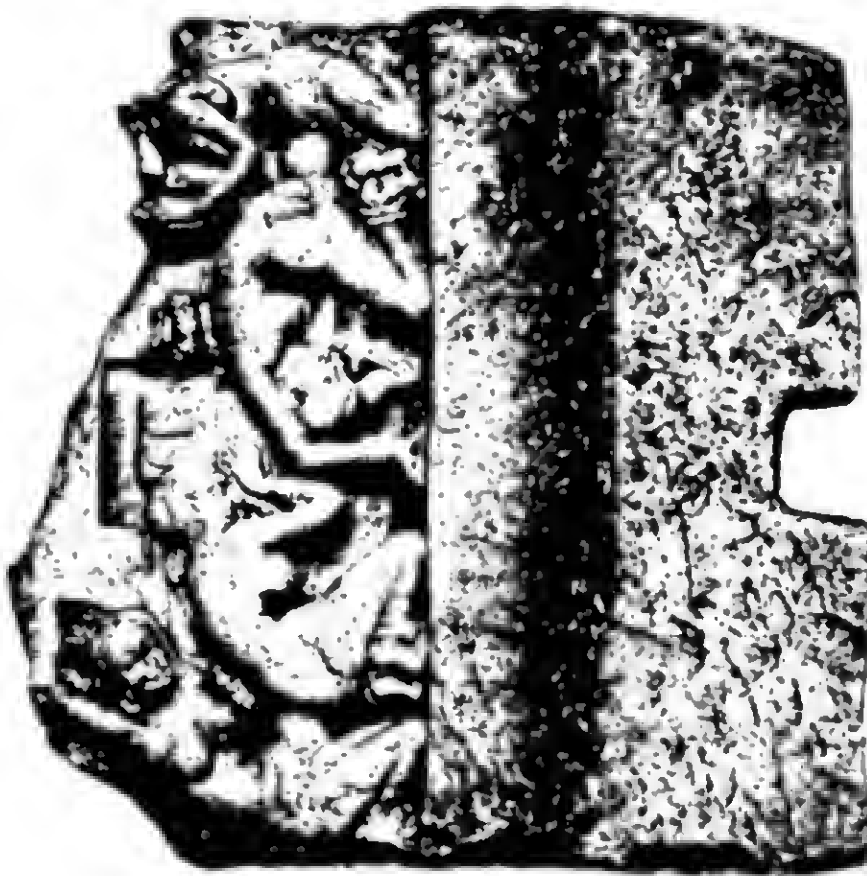


FIG. 15. WOMEN ADORING BUDDHA
Amaravati, Guntur Dt.



Fig. 16. YAKSHI INSIDE A KUDU
Amravati Guntur Dt.



Fig. 17. BUDDHA
Kanchipuram, Chingleput Dt.



Fig. 18. BUDDHA
(Plaster Cast), Mathura.

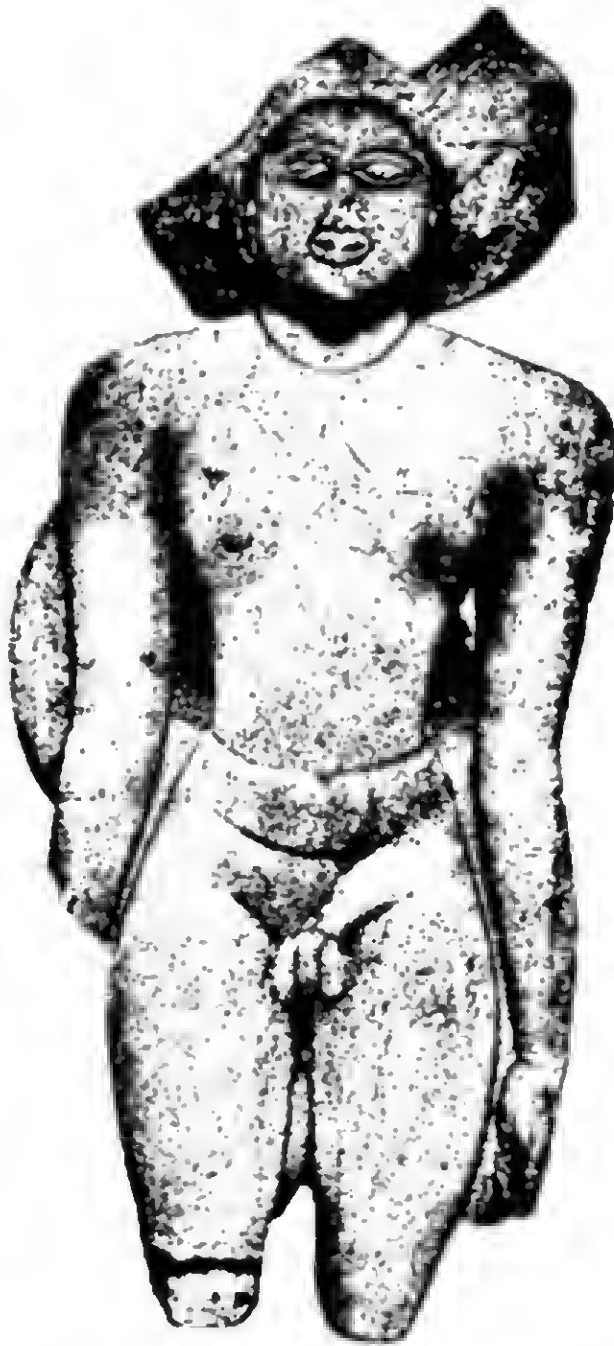


Fig. 19. PARSVANATHA
Duvulapadu, Cuddappah District.



FIG. 20. NISHIDIKA
(inscribed Tomb Stone)
Donavulapadu, Cuddappah Dt.



Fig. 21. TIRTHANKARA
Tuticoria.



Fig. 22. PARVATI
(Copy of a mural)
Panamalai, S. Arcot Dx.



Fig. 23 ARDHANARISVARA
Tiruvenkadu, Tanjore Dt.



Fig. 24. CHANDIKESVARA
Chandikesvara, Tanjore GA.



Fig. 25. NATARAJA
Tiruvelangadu, Chingleput Dt.



Fig. 26. VINADHARA
Podur, Salem Dc.



Fig. 27. VISHNU
Adikudi, Trichy Dt.



Fig. 2A. RAMA GROUP
Vedakkuppanaiyur. Tanjore IX.



Fig. 29. RAMA GROUP
Tiruvelangadu, Tanjore Dt.



Fig. 30. VENUGOPALA WITH CONSORTS
Chimakurti, Gunter Dt.



FIG. 31. SIMHANADA
Nagappattinam, Tanjore Dt.



Fig. 32. MAHAVIRA
Selaganikkuppam, S. Arcot Dt.



FIG. 33. MAHAVIRA
Sivagunga, Ramanathapuram Dt.

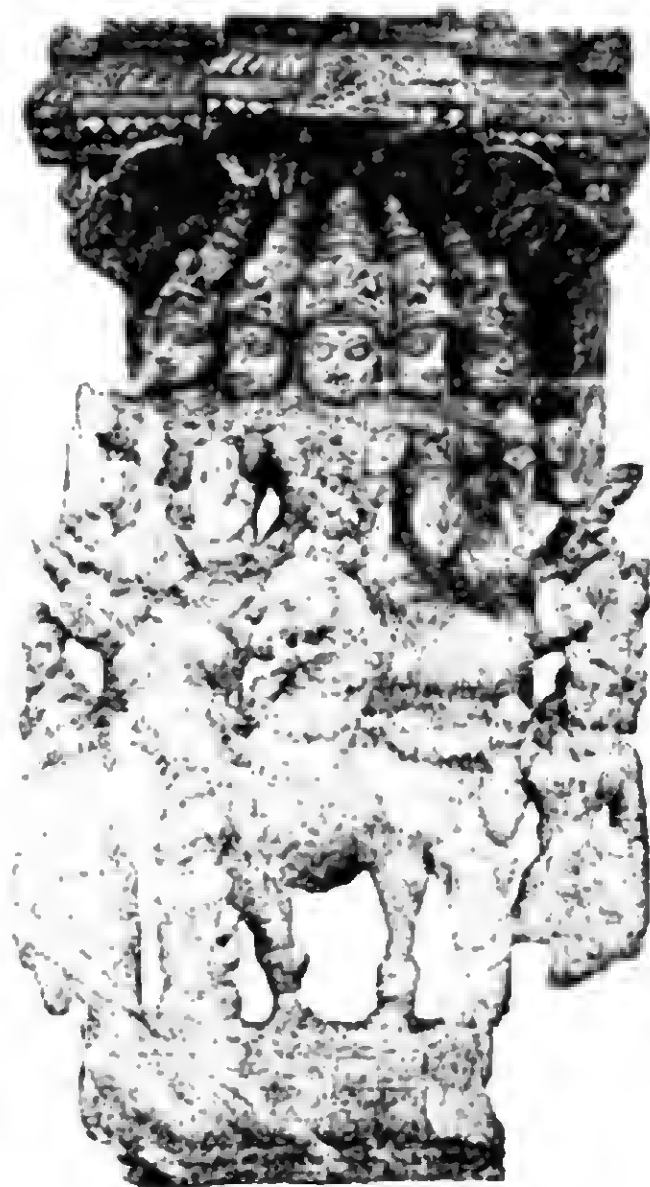


Fig. 34 SUBRAHMANYA
Wood Carving.

THE NATIONAL ART GALLERY

By

R. NAGASWAMY, M.A.

(Formerly Curator for Art and Archaeology)

The art of both secular and religious paintings is well known in Southern India long before the Christian era. Tolkappiam, the earliest Tamil literature, refers to the art of painting then in vogue. Sangam literatures which are assigned to the early centuries of the Christian era throw much light on the nature of art and its influence on the social life of the people. The ceilings of temples were decorated with paintings depicting scenes from mythology. The bed chambers, courtyards and other halls of the kings and their retinue were beautifully decorated. Since perishable materials were utilised for construction of temples and halls nothing of this period has survived.

With the advent of the Pallava rule in South India paintings of comparatively permanent nature were executed on the ceilings of rock cut caves. Mahendravarman Pallava, who ruled from Kanchi about 600 A.D. was a great connoisseur of art and was called "Chitrakarapuli" the tiger amongst the artists. Fortunately, the paintings at Sittannavasal executed at his command are left intact to speak to the future generation the gaiety and splendour of art during this period. His successors continued the patronage and fragmentary paintings are still available in some of the temples.

The great Cholas who ruled the South after Pallavas rivalled the Guptas of the North in patronizing art and literature. The rhythmic and graceful paintings of Tanjore Brahadeeswara temple built by the great Raja Raja Chola is the best example of this period. The Vijayanagar kings who conquered the South in about 1350 A.D. and their successors, the Nayaks, followed the footsteps of their predecessors with the result that large scale wall paintings continued to be the fancy upto the beginning of the 18th century. Paintings representing various periods in the development of South Indian art, were copied from temples and are now exhibited in the picture gallery. We have no knowledge of the existence of miniature paintings as that of Rajasthani or Mughal, though it is not quite improbable that some kind of illustrations to manuscripts might have been in vogue. There undoubtedly existed a traditional school of painters who prepared the ground on wooden support

with gesso and executed paintings by embedding gold stipplings and colour pigments. It is not uncommon amongst this school to make use of pearls, precious stones, gems etc. for such purposes. This tradition has continued to exist upto the last quarter of 19th century and has recorded a steady decline since then. The 18th century paintings of this school are exhibited in the left side panels of the main hall, virtually marking the beginning of various schools exhibited in the gallery.

During the iconoclastic rule of Aurangazib, the painters of the Mughal school had to seek asylum in Deccan for their livelihood. Some of the artists migrated to Andhradesa, while some were appointed at the Court of Tanjore. The Maratha Kings called Rajas held sway over Tanjore for about 100 years from the middle of the 18th century, and due to the patronage of these rulers the Tanjore school of art was ushered in. But the Tanjore school had a different setting and the characteristic of the traditional and Rajput schools were met and debased by influences from outside India. The former impersonality of the figures was lost. Like the Mughal school, the Tanjore school became almost completely human with Rajas and Ranis dressed up as for a photograph and turned their eyes towards the spectators. Devotion and imagination were reduced to next to nothing. Yet in both the Andhradesa and Tamil schools the oriental love of elaboration in costume and environment remained. This school is represented after the traditional school of paintings on left side panels of the main hall.

Rajput paintings:—The miniature paintings produced at the court of the Rajput kings from a distinct group and they were contemporary with the miniatures produced in the Mughal court at Delhi. From the middle of the 16th century to the end of the 18th, an extraordinary activity of the school produced an immense number of paintings whose complete total is still a matter of conjecture. Of these by far the largest majority are small in size. The chief quality of the Rajasthani paintings is their idealistic representation of the emotional aspects of the Indians. The figures of human beings and those of animals and birds are also idealistic. The themes are varied and sentiments of love and devotion are mingled with an exuberant joy of life, the common subject matter being the Krishna legends. The most important class of the Rajasthani miniatures is the series of Ragamalas or paintings of the musical modes. The best examples are those of the 17th century. The paintings, like the poems which they illustrate, represent situations of which the emotional colouring

corresponds to the feeling or burden of the musical mode. These are exhibited in the sloping central cases, beginning from the 17th century Ragini paintings.

Kangra School:— Between the late 18th century and early 19th century, the whole Kangra valley and adjacent Punjab plains were filled with very sensitive and highly emotional band of artists who were responsible for the ushering in of the Kangra school of paintings. The Krishna subject predominates in this school. Their chief feature is their expressive line in which they may be regarded as distant descendants of the Ajanta frescoes nine centuries earlier.

Mughal School:— The Mughal emperors were enlightened patrons of art and they encouraged the art of painting. Akbar and some of his successors are said to have learnt the art themselves and invited master artists to their courts for illustrating many a masterpiece of Sanskrit and Persian literature. Among these illustrated works are the Hamsa Nama, Ramayana the Akbar Nama and other works. During its earlier phases, Persian influence was predominant while at later times it yielded steadily to indigenous influence. Religious and metaphysical ideas which were predominant in Rajput paintings did not enter into Mughal paintings which confined itself to visible and tangible things not thought of or imagined. Its chief subject contribution to art is its gallery of contemporary portraits, small and in water colour of the Mughal emperors and their eminent contemporaries. These were painted realistically without the atmosphere of symbolism though with a conventional departure from the normal in the halo round the head of royalty and the artificial arrangement of the feet. These find their place on the other side of the sloping cases.

Deccani School:—The Deccani paintings are an off shoot of the Mughal school, which flourished during the 17th and 18th centuries under the patronage of local rulers of the Deccan states of Golconda and Bijapur. Portraits, Ragamalas and book illustrations formed the subject of this school as was also large scale paintings on canvas. Two specimens of paintings on canvas are included in the exhibits. Representative paintings of this school are exhibited at the right side corner panel of the main hall

Paintings of Ravi Varma and allied School:—The extreme of foreign influence in the development of Indian paintings, was reached with the advent of Raja Ravi Varma when he won the

British Governor's prize in 1873. Though he copied the western technique, Ravi Varma choose for his subjects, themes from Indian mythology. Because of his westernisation, he was not popular with the revivalists of Bengal. His competently drawn illustrations of legends reached a wide public and fixed at least a minimal limit of technical adequacy for this type of production. His son Rana Varma and a host of others carry on the Ravi Varma traditions. Amongst his paintings exhibited here, *Sakuntala* and *The Miser*, speak of his elegance.

Modern paintings :—A revivalist school of painting was started in Calcutta by E. B. Havell and Abanindranath Tagore who wanted to bring back to life the lost traditions of ancient Indian painting. The prominent artists of this school are Nandalal Bose, Roy Chowdhury, Haldar and others. The works of these artists are characterised by a striving after the perfection of draughtsmanship and suggestion of spiritual significance unlike the ultra realistic delineation of subjects in western paintings. Further, great stress is laid on traditional technique and the choice of subjects from Indian life.

The revivalist school of Bengal is represented here by D. P. Roy Chowdhury, Sirada Charan Ukil, Abdul Rahman Chaghtai, Promode Kumar Chatterjee and others. These are exhibited in the right side panels, of the main hall.

The Madras school of arts has been able to discover a number of promising artists whose works are considered to be of a very high quality. Amongst these artists are K. C. S. Paniker, K. Srinivasulu, P. L. N. Murthy, S. Dhanapal and others. The modern trend amongst some of these artists is towards impressionism, a judicious selection from nature and a sketch improvisation rather than imitation. The near view that emphasised form is replaced by the distant view of objects seen out of door under the influence of light and atmosphere. Outlines are replaced by opposing patches of light and darkness. At the rear hall of the gallery, are exhibited the paintings of this school.

Recently yet another group of artists sought to revive the art traditions of rural India. The most important artist of this school is Jamini Roy of Calcutta. Two of his paintings find a place amongst the exhibits.



Fig. 35. THE NATIONAL ART GALLERY



Fig. 36. CORONATION OF YUDHISHTHIRA
17th Century



Fig. 37. BUST OF RAJA
Tanjore School



Fig. 38. A RAG RAGINI PAINTING
Tempera on paper—Rajput, 17th Century



Fig. 39. MUSICAL MODE RAGINI GAUDAKALI
Thick tempera on paper—Rajput, 17th Century



Fig. 40. RADHA AND KRISHNA
Kangra Painting—Rajput, 18th Century



Fig. 41. AN AMOROUS SCENE

Tempera on paper Mughal—About 18th Century

NUMISMATICS

BY

R. VANAJA, M.A., M.Litt.

(Formerly Curator for Numismatics)

Introduction : One of the richest collections in India, the coin collection of the Madras Government Museum is remarkable for the variety, rarity and antiquity of the various classes of Indian coins it represents. The entire history of Indian coinage, starting from about the 6th century B.C., to the end of the 19th century A.D., is well represented in it. At present, there are in the collection of this Museum more than twenty five thousand coins of gold, silver, copper and of the alloys billon and potin, three fourths of which are Indian coins and the rest foreign ones of the modern period. A specially built strong room provides for the storage of these coins in safes.

The coins in the collection of this Museum are under the joint custody of the Superintendent and the Curator in charge of the Numismatics Section. The Curator of this section attends to the work of cataloguing and registering these valuable coins and also examines hoards of treasure trove coins received from the Collectors of various districts in the State and decides whether they are worth acquiring for the Museum coin-cabinet. Out of the treasure trove coins thus acquired, those required for the stock are set apart. The surplus coins are then distributed to other institutions in the country and the rest are set aside for sale to the public.

It is interesting to note that most of the South Indian Coins were acquired as treasure trove hoards from all parts of South India. But treasure trove hoards are not the only source through which coins are received here. In fact the entire collection of North Indian coins in this Museum has been built up mainly as gifts of coins donated by North Indian Museums and institutions such as the Prince of Wales Museum, Bombay, the Bombay Branch of the Royal Asiatic Society, the Asiatic Society of Bengal, the Indian Museum, Calcutta, the Central Museum, Nagpur, the U.P. Coin Committee and so on. Coins of North India especially those of the Indo-Bactrian Greeks, the Kushans, the Guptas and among later coins, those of the Muslim Sultans of Delhi and the Moghuls were gifted to the coin cabinet of

this Museum, under what is called the distribution gratis scheme which makes provision for the distribution of surplus coins of an institution among those institutions mentioned in the distribution list. Coins purchased from private coin-collectors has filled up many a gap in the history of South Indian coinage. It is rather difficult to come across South Indian copper coins which find their way more easily into the cabinet of a private collector and it is only by purchasing them that it would be possible to fill up many gaps in our stock of South Indian coins so as to get a connected picture of South Indian coinage especially of the coinages of the three great Tamil kingdoms of the South.

North Indian coins:—Out of the entire collection, nearly one half represents the coinage of Northern India from the earliest times to the present day. From the time of Alexander's invasion of India in the 4th century B.C. and even earlier, coins afford invaluable aid to the researches of the historian and for the history of the Indo-Bactrian Greeks and the Indo-Parthians they constitute almost the sole evidence.

The earliest coins here are the Puranas or Punchmarked coins, presumed to have been in circulation upto the beginning of the Christian era in Northern India. These coins, of which there are over 3000 in the collection, have been classified on the basis of the symbols punched on them as Pre-Mauryan, Mauryan and Post-Mauryan. The peculiar symbols found on them give us no clue whatsoever to the identity of the issuer. The absence of a date or a name only adds to the confusion.

Remarkable for the fine series of portraits and the names of rulers recorded on them, the Indo-Bactrian Greek coins in the Museum collection—especially the coins of the family of Demetrius, those of Apollodotus I, Menander, Strato I and Zoilus are interesting pieces. These coins which mark the preliminary stages in the intermingling of Eastern and Western cultures bear legends in two languages—Greek and Indian. These "Portrait-head" type of Indo-Greek coins influenced Indian coinage to such a great extent as to replace old traditional modes of representations and devices.

The Kushan coins show definite traces of the influence of these Greek coins, in the mode of representation of the king, his costume and various other minor details. The gold and copper coins of the Kushans bear on one side the figure of the king either seated or standing and on the other Greek deities which gradually give place to Indian ones. The coins of the

famous Kushan monarch, Kanishka are noteworthy, for the evidence which they afford for the gradually changing ideas of the monarch and of the people whom he subdued. His distinctively Buddhist coins in the collection which are very rare, exhibit the image of the Buddha—with his name in Greek letters and his other coins bear on the reverse a strange medley of gods—Greek, Persian and Indian. The coins of Vasudeva, especially his gold dinars, which are in the collection, showing the figure of god Siva on one side attended by his bull Nandi with the noose, trident and other insignia of Hindu iconography bear testimony to the rapidity with which these foreigners had succumbed to the influence of their Indian environment.

While showing little trace of foreign impact on Indian coinage, the Gupta coins exhibit a tendency towards Indianisation at least in details if not in the general type of coinage. Illustrative of the golden age of Hinduism, these coins (of which we have not more than twelve in our collection) bear inscriptions in classical Sanskrit—the names and titles of the king—and are perhaps the best examples of the Indian engraver's art. They portray the figure of the king in various attitudes (a favourite attitude seems to be the killing of a rhinoceros or a tiger) on one side and the figure of either the queen or a goddess on the other. Of special interest to us is the famous Chandragupta Kumaradevi coin in our cabinet, which commemorated the marriage alliance of the famous Gupta monarch Chandragupta I with Kumaradevi, Princess of the Lichhavi clan. In this coin, we have a permanent record of a historical event.

The limited coinage issued by the numerous Rajput states during 8th-11th centuries A. D., is marked particularly by want of originality. This is evident when we study their "Bull and Horseman" coins in this collection. The Rajputs issued these coins in copper and billon (alloy) with legends in Nagari script. Though in no way original, or either artistic for that matter, still these coins were copied by earlier Muslim Sultans of Delhi, especially Muhammed bin-Sam Ghor and his immediate successors.

The coins of the early Muslim Sultans of Delhi, issued in the beginning of the 13th century A.D. are in no way interesting as they follow very closely the currency of the Rajputs whom they subdued. It was more a matter of expediency—a sort of concession to their conquered. But coinage was too closely bound up with the history and traditions of their religion to make this

a lasting compromise. The result is that the later Muslim Sultans issued coins, replacing the older type, moulding them according to their religious convictions. These later types of coins of which there are in the Museum collection quite a good number, such as those of the Khiljis, the Tughlaqs, the Sayyids, the Lodis and the Surs do not have any portraits or figures. Their religion, Islam, forbade imagery of any form. Both faces of the coins bear only inscriptions in Persian, on one side the Kalima or the Muslim Profession of faith and the name of the king, his titles, and the date in the Hijrah era on the other. Of particular interest to the student of history are the coins which we have here, of Alauddin Muhammad Shah Khilji, Muhammad III bin Tughlaq and that famous reformer Sher Sha. While Alauddin's cherished dream of finding a new religion, and his dream of the conquest of the world as a "Second Alexander" find expression on his coins, the coins of that "Prince of Moneyers" Muhammad III bin Tughlaq reveal his personality, the various phases of his career, his early wealth and finally the financial disaster which he attempted to meet by the issue of a forced currency. The silver coins of Sher Sha, in the Museum collection may not be very interesting from an artistic point of view but still as the precursors of the Moghul and the British rupees, they have their own value.

The Moghul coins, in the coin cabinet of this Museum are the best in the whole series of medieval Indian coins. The three thousand Moghul coins in the Museum collection represent the coins issued by almost all the Moghul rulers in India. Even the coins of pretenders have found their place in the cabinet, helping us to fill many a gap in the history and chronology of these Great Moghuls. A systematic arrangement of these coins in a safe, helps us to locate the coins instantly. One distinguishing feature of our Moghul coin collection is that it includes not only their mohurs and rupees but also the pagodas and fanams issued by some of the later Moghul monarchs, Ahmad Sha, Muhammad Sha Alamghir II and Shah Alam II from their South Indian mints. The Moghul coins follow closely the coins of the Sultans of Delhi in general outline, but of the two, they are more interesting. The coins of the three great Moghul emperors, Akbar, Jahanghir and Shahjehan of which the Museum possesses a good collection, express their artistic temperaments. Of particular interest to us are the Din-Nahi mohurs issued by Akbar to propagate his famous "Divine-faith" and the famous zodiacal coins issued by Jahanghir which are unparalleled in

the Moghul coin series. Unfortunately we have only two coins of this type, bearing pictorial representations of the twelve signs of the zodiac which is a novel mode of representation. The pagodas and panams (these are the highest and lowest denominations of South Indian gold coinage) issued by later Moghul emperors are other interesting pieces.

The native coins - issued by Indian States for a period of hundred years after the decline of the Great Moghuls, baffle attempts at identification and explanation as they were closely modelled on the Moghul coins. Of the coins of this type, we have only a few, identified on the basis of a chance discovery of some sort of characteristic ornamentation adopted by them. Less difficulty is experienced however in attributing those coins chiefly of a later date, bearing the names and titles of the issuer in several languages, and also those coins which show traces of British influence. Until 1835, many of the Indian states were issuing coins, but later one by one their mints were closed down.

South Indian coins :—The collection of South Indian coins though not a large one as one might expect it to be, is still a remarkable one, representing almost all the types of coins that have been found in South India. Coins of the Western and Eastern Chalukyas, coins of the Tamil kingdoms, the Cholas and the Pandyas and of more recent times of Vijayanagar and the Mysore kings are a few noteworthy items not to speak of the doubtful coinages of the numerous petty kingdoms like the Hoysalas and the Yadavas issued during the 11th - 14th centuries A.D.

One of the most interesting collections is that of Roman gold and silver coins, received in this Museum as treasure trove hoards from places in and around Coimbatore district. It is stated that the currency of the South in the 1st - 2nd centuries A.D. consisted of imported Roman gold. Finds of these coins in South India bear testimony to the commercial intercourse between Ancient Rome and Ancient India.

The Andhra coins of which we have well over 6000 lead and potin coins are the earliest dynastic coins of the South bearing legends giving the dynastic names coupled with religious devices. Illustrative of an age when Buddhism was the flourishing religion, these coins show that regard for the sanctity of animal life which was one of the most cherished features of Buddhism

Of an entirely different technique from the Andhra coins are the Padma-tankas or cup-shaped coins with fine impressions in relief on them. The coins of the Western Chalukyas are of this type with legends in old canarese, punched on them, along with the device of either a lion or a temple. Of much the same type are the famous Kodur treasure trove coins, said to be the issues of the Telugu-Cholas, who were powerful rulers during the 13th century A.D.

Specimens of Eastern Chalukyan coins available in the Museum collection do not illustrate more than three of the numerous princes whose names have been definitely fixed by inscription. Being votaries of Vishnu in his incarnation as a boar, it is only natural that these Chalukyan princes should portray their favourite object of worship on their coins. Coins of Rajaraja with a boar in the centre and the name of the king in Telugu grantha characters are available in the collection. The boar symbol was subsequently adopted by the Pandyas of Madura and the Rayas of Vijayanagar.

The paucity of numismatic evidence is not peculiar to the Chalukyas alone, but it is also the characteristic feature of the coinages of the three great Dravidian kingdoms. The Cholas, once a great power in the south, have left monumental proofs of their sovereignty, but very few of their 'pons' and "madais" have survived them. Among their few coins in the Museum collection mention may be made of the "Ceylon man" coins of Rajaraja I in gold and copper. Much more interesting is the coin which commemorated Rajendra's conquest of the principalities in the Gangetic valley. Coins of Kulottunga I, found recently at Dowleshwaram in East Godavari District along with the gold coins of the Eastern Chalukya ruler Rajaraja, has considerably enriched our Chola coin collection, providing us with proofs for his conquests of Makinad-parts of Coorg and Kheda in Malaya. These commemoration coins bear legends in Tamil grantha characters, with their dynastic emblem the tiger, with the Pandyan fish and the Chera bow and arrow, in the centre of the coin. This practice of incorporating on their issues, the cognizance of the conquered people along with their own seems to be a favourite device of not only the Cholas but also other South Indian dynasties.

Great difficulty is experienced when identifying the Pandyan coins in the Museum collection. Brief legends appear on them. With the exception of their gold coins, identified as the issues of

Dhananjaya, their copper coins with fish symbol and Tamil legends issued during the 7th - 13th centuries A.D. cannot be attributed to any one particular ruler as the titles found on them were titles of not one king but used invariably by other rulers as well. Among the Pandyan silver coins here, mention may be made of the "Bodinaikkanur" hoard of punch-marked coins, which have fish symbol on the reverse. These are the only type of Purana coins peculiar to South India, said to have been issued during the 1st — 2nd centuries A.D.

The coins of the Forgotten empire of Vijayanagar, in the collection of this Museum are abundant and many varieties, containing the issues of almost every one of the kings of all the three lines with the figures of deities—both Saivite and Vaishnavite demonstrating the revival of Hinduism, by the end of the 14th century A.D. are represented in the collection. The Vijayanagar coins afford a striking proof for contemporary condition. It was not unusual for the same sovereign to exhibit his religious neutrality by issuing coins bearing both Saivite and Vaishnavite emblems.

The coins of the two Mysore Sultans, Haider Ali and Tipu Sultan are fairly well represented in the present collection. Their short rule of thirty eight years in Mysore produced an infinite variety of coins. Though an orthodox Muslim, Haider Ali had issued pagodas and panams with figures of Umamahesvara on one side and his initial on the other. It is of course the coins of his son Tipu, which are more instructive. His mohurs, rupees, pagodas, panams and cash pieces each named after either a caliph or a saint were issued from his various mints in the South, and reflect his staunch orthodox. Some of his coins are the earliest to have a crude milling.

Finally, mention should be made of the coins issued by the European powers for their factories in South India. Basing their currency on the native coinage, these European powers especially the Danes, the Dutch, the French and the English have issued coins with figures of Hindu gods and goddesses. Of particular interest to us are the coins of the English East India Company, especially those struck at Madras during the years 1651 — 1814 A.D. of which we have the best collection in this Museum. These coins circulated during the 17th and 19th centuries A.D. when finally they were withdrawn and the Rupee became the standard Indian coin.

Rare Primitive types of coins :—An account of the coin collection will not be complete without a reference to the rare primitive pieces of money.

Under this category, the larins or the laris issued by some of the Bijapur Sultans and even by the Moghals in the 16th century A.D. have to be classified. These laris are shaped like the laris which were in use in the Persian Gulf.

More interesting, however, are pieces of Chinese primitive money of the spade, knife and key variety, purchased for the collection.

Specimens of primitive type of coins, of a recent date are the eight copper plates which were unearthed recently in Pinjur village, Chengam Taluk, North Arcot District. These eight copper plates are specimens of Swedish plate money issued during the 18th century A.D. and are very rare. One of them is illustrated in figure 46.

Medals :—There are at present two hundred and fifty medals in the section, a majority of which are exhibition medals, of very little interest. The rare pieces are the Mysore Medals. These Mysore medals were awarded by the East India Company for services during the Mysore wars. On the obverse of the rare Mysore Medal of 1791—1792, the figure of an English soldier is seen holding the British standard, half unfurled, with a distant view of the fortifications of Seringapatam and the following Persian inscription which reads as "Struck in the years 1791—92 (corresponding with the Mohammadan era 1202)", a memento of the self sacrificing devotion of the British government in Mysore. Another interesting piece, the Seringapatam medal of 1799 was distributed to officers and soliders — both European and native. On one side of this medal is represented the storming of the breach of Seringapatam from an actual drawing on the spot with the meridian sun denoting the time of the storming of the city and the Persian inscription which reads thus "The Fort of Seringapatam, the gift of god the 4th May 1799" underneath. On the other side of this medal is the British lion, subduing the tiger, the emblem of Tipu Sultan with the date of the conquest. The bronze medal depicting Lord Cornwallis on one side and the scene of the surrender of Tipu's sons as hostages is the most interesting piece in the Mysore Medal series.

The collection has also a few foreign medals German and French of which the French medal depicting the scene of the arrival of the king in Paris 1789 A.D. is a rare specimen.

Charters, Documents, etc. :—Original charters, documents and treaties relating mostly to the history of the English East India Company in the 17th and 18th centuries A.D. were handed over by Madras Record Office on a permanent loan basis to this Museum and since then, they are under the custody of the Curator, Numismatics Section.

Documents in Indian languages, letters written by famous personages like Lord Clive and General Lally are some of the interesting charters. Besides these, the collection includes a facsimile of the Great Charter of England, the Magna Carta of 1215 A.D. believed to be the only copy in India.

Research and Publication :—The results of research work done on the various types of Indian coins in the collection have been published from time to time in the Bulletins of this Museum. Outstanding publications are Dr. Bidies "Pagoda or Varaha coins of Southern India, which continues to be of interest even to-day, and Dr. Thurston's History of the coinage of the territories of the East India Company in the Indian Peninsula, and Catalogue of the Coins in the Madras Museum. For a clear and concise account of the coinage of the two Mysore Sultans, Dr. Henderson's catalogue is of invaluable aid.

Shortly to be published are the valuable works of Prof. T. Balakrishna Nayar, Principal, Presidency College on the Eastern Chalukya and Chola coins of the famous Dowleshwaram hoard of gold coins, and of Mr. T. G. Aravamuthan on the Roman and Byzantine coins in the Madras Museum.

In conclusion, however, it may be mentioned that the collection of coins in this Museum though an interesting and comprehensive one so far as Indian coins are concerned has still ample scope for improvement. In fact, there are very few pieces of primitive types of money of foreign countries. It is hoped that this deficiency in the Museum collections, especially in examples of primitive pieces of money from countries like Africa, will be rectified so as to make it a comprehensive one representing money of not only our country but also including an index to the various types of coinage of other countries as well.

PLATE XLII



Fig. 42. SERINGAPATAM MEDAL.



Fig. 43. MEDAL ISSUED TO COMMEMORATE THE TAKING OVER BY LORD CORNWALLIS OF TIPU'S TWO SONS AS HOSTAGES

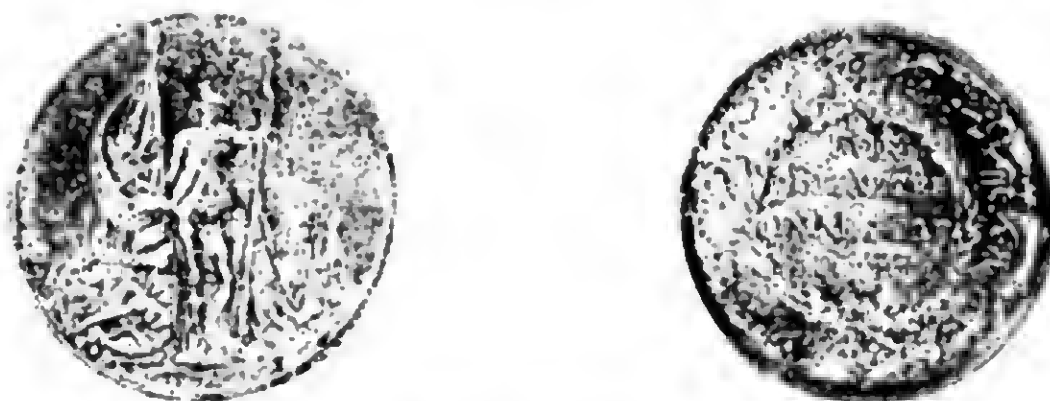


Fig. 44. A MEDAL ISSUED FOR SERVICES IN MYSORE.



Fig. 45. MEDAL SHOWING THE ARRIVAL OF THE KING IN PARIS

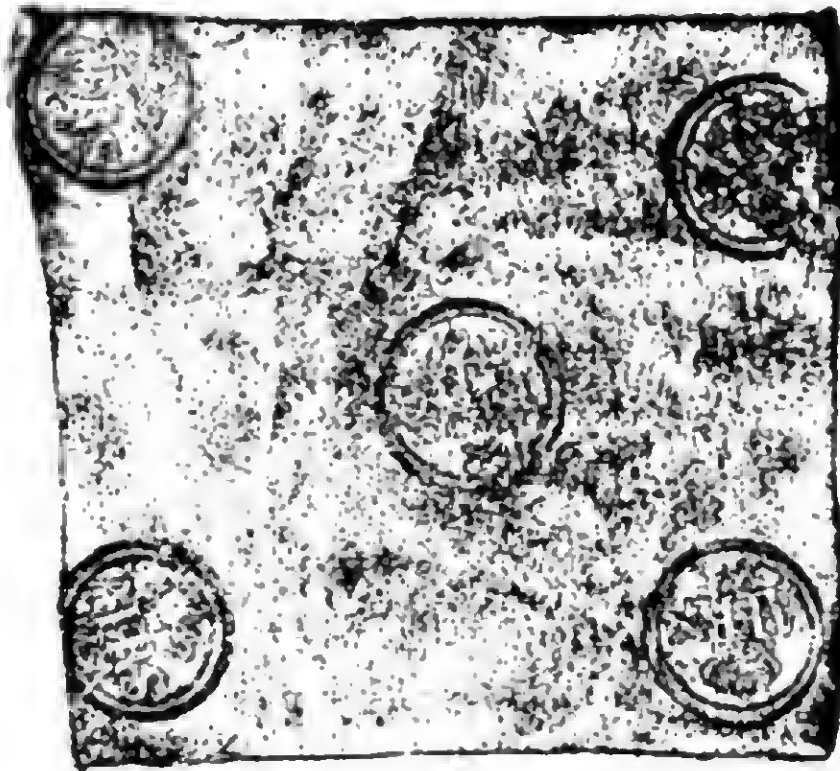


Fig 46. SWEDISH PLATE MONEY

ANTHROPOLOGY

By

C. J. JAYADEV, M.A., L.T.,

(Assistant Superintendent (Retired), Government Museum, Madras)

The life of ancient man in India over a hundred thousand years ago to the beginnings of the historic period is depicted in the Prehistory section of the museum by a wealth of artifacts characteristic of the stone, copper or bronze and iron ages in succession. In 1878 Surgeon General G. Bidie, the then Superintendent of the Museum made Ethnology a museum subject to be illustrated by prehistoric antiquities and ethnographic materials. World famous collections of palaeolithic and neolithic tools, ancient pottery, ornaments, beads, weapons, agricultural implements and utensils and other ritual objects of the early iron age associated with urn burials and rude stone monuments or megaliths help us in understanding the culture of the ancient South Indians.

The *prehistoric antiquities* of this museum are exhibited partly in the ground floor of the front building to the rear of the Museum Theatre and partly in the first floor of the new extension at the entrance of the Museum. The former include the large classical collections made and catalogued by the pioneers of prehistoric studies in India, namely, J. W. Brecks, R. B. Foote and A. Rea. The latter consist of typical exhibits from Mohenjodaro and Harappa. The Brecks collection together with the collections of Cardew, Rea and others were catalogued in 1901 by R. B. Foote and these constitute the earliest of the museum collections in prehistoric antiquities. The Foote collection of prehistoric and proto-historic antiquities was acquired for this museum in the year 1904 by the Government of Madras at a cost of Rs. 40,000 and catalogued by Foote himself in 1914 and his *Notes on Ages and Distribution* came out in 1916 as an additional illustrated publication. The finds from the Adichanallur urn burials and the Perumbair megaliths were catalogued by A. Rea in 1915. These with the large collections of Krishnaswami, Manley and Aiyappan representing the stone age culture of Southern India constitute one of the world's largest collections of prehistoric antiquities gathered together in one museum and form the index collection for reference, study and research for prehistorians from all over India and abroad.

Augumenting this huge Indian collection which practically covers the whole of peninsular India are small but highly typical and representative collections of Stone Age antiquities from the world over built up by this museum on an exchange basis. Among the countries and cultures thus represented are the Rostrocarinates, Abbevillean, Acheulean and Neolithic of England, the Mousterian and Magdalenean of France, the palaeolithic of South Africa which resembles the Madrasian in many respects, the Neolithic of Egypt, the Tampanian of Malaya, the Patijitanian of Indonesia, the Choukoutenian of China and collections of stone tools and pottery representative of the prehistory of the United States of America and the neolithic of Japan.

The Old Stone Age:—The earliest known remains proved to be definitely of human industry belong to this age. All the tools used by men at this time were of hard stone, and they were prepared by chipping with other stones so as to give them a sharp edge or a point. Their surface was left rough. The stone age can, to some extent, be dated with reference to the geological remains indicating successive changes in climate or in the animals living at that time. The palaeolithic of South India is said to be roughly 125,000 to 500,000 years old. During this age man was essentially a hunter and food gatherer wandering in search of game and collecting fruits and digging up edible roots. This was the age of crude and unpolished stone tools, roughly flaked and chipped. In South India such tools have been obtained in numerous localities from beds of laterite where thousands of years must have been required, after the tool makers had left them for the thick deposits overlying them to be laid down. The great antiquity thus indicated for some of the tools is supported by others having been found in association with fossil remains of animals which have become extinct long ago in India. Quartzite was the stone most commonly used in South India, as flint which can be more easily and efficiently worked was too rare to be had for this purpose, as it was in Europe, where it is abundant.

Of palaeoliths the most commonly known are the so called hand axes, bifaces, bouchers or coup-de-poings. These are made from pebbles of suitable size by removing large flakes from the upper and lower surfaces especially at the narrow end. On some of the tools parts of the original pebble surface can be seen. These were not provided with a handle but were held in the hand when used hence their name hand axes or coup-de-poings.

Simpler types of tools made from rounded pebbles by removing very few flakes are the pebble tools and these when worked further gave rise to the chopper tools of the Soan industries. These chopper types are seen not only in the Madrasian localities but also throughout South East Asia. Another common type of palaeolith which is characteristic of Madras is the cleaver. It is a flat axe-like tool, with a broad cutting edge, formed by the intersection of two flaked surfaces inclined to one another at a small angle. Cleavers were ordinarily made from flakes rather than from pebbles. They can only be made from quartzite and not from flint, and are characteristic of the quartzite users of Africa and India. One special type of these cleavers is the guillotine type, characteristic of the Madras facies. The very first palaeolith discovered in India in 1863 by the eminent prehistorian Robert Bruce Foote belongs to this Madrasian type and is a very important exhibit of this Museum in constituting the very first landmark in the prehistory in India (Fig. 47). Finer hand axes or Ovates came to be made during the second phase of the palaeolithic when flaking became more refined and extended all round the pebble from which the tool was made. In addition the edges were further chipped with the result that the tool became more efficient. Scrapers were made from rather large flakes. They have a convex cutting edge running along on one side only, the opposite side being blunt. Scrapers are used for skinning animals (Fig. 48.)

The Middle Stone Age:—Towards the close of the palaeolithic age ancient man began the art of working small flake tools of agate, chalcedony, chert, carnelian, jasper, obsidian and quartz. These tools were attached in series to a handle and were used for cutting. On account of their small size they are called pigmy flakes or microliths. Large numbers of waste cores from which such flakes have been removed show how these small tools were made. These fine tools are found in a wide range of forms called blade, burin, lunate, triangle, etc. Microliths have a wide distribution in India and are dated to about 10,000 B.C. As these small tools come to occupy a position midway between the old and the new stone ages they are said to belong to the middle or *mesolithic* age though they survive in the later neolithic phases. Thus there is no hiatus between the old stone age and the new stone age. As mesoliths are not found in Burma they are to be derived from the mesolithic of western Europe.

The New Stone Age:—The neolithic age is represented by tools and weapons made by chipping and subsequently grinding

and polishing hard and tough stone suitable for the purpose. The stone axes and adzes are well shaped and polished and their edges sharpened by grinding. After centuries and millenia of experience gained in the preceding age, Neolithic man perfected the art of stone tool making. The polished stone axes or celts have a very wide distribution showing that the human population had increased considerably since the palaeolithic age. The celts were hafted or provided with handles of wood or bone and used. Most aboriginal peoples the world over regard these celts as thunderbolts from heaven and worship them as they do not know their use. Among neolithic celts there are various types ranging from thick axes almost circular in cross section to flat chisel like tools which are sharp at both the cutting edge and at the butt end. They were made of hard rocks such as diorite and basalt or more rarely fine grained sandstone. Some of the neolithic axes were merely chipped in a more or less careful manner and then slightly polished along the cutting edge only. But in the making of a fine celt there were many stages. A piece of rock was first selected and roughly chipped into form. Then it was pecked, that is, angularities due to chipping were broken down. Then the implement was ground and all the roughness smoothened away when it was ready for inserting the handle. The typical neolithic celt has a broad rounded cutting edge and pointed butt with oval cross section. (Fig. 49) The neolithic celt which is the prototype of the early hoe blade of iron is thin and broad and of uniform thickness, the cutting edge being somewhat broader than the butt end. The first metal tools which were made during the Bronze age are said to be copies of this type of stone tool. The corn crushers and hammer stones, the mealing stones and saddle querns are also neolithic stone tools used in milling and grinding corn or grain for food. The neolithic age was a period of such great progress and change in the way of life of primitive man that it was called the neolithic revolution. This change from food collection to a food production is of such great moment that even to-day it forms the very basis of our socio-economic life. It was during this age which probably began over 10,000 years ago that man came to know and use such revolutionary changes as agriculture, the domestication of animals, spinning and weaving, living in permanent settlements and making and using pottery, for all of which neolithic sites in India are yielding abundant evidence. Pottery was in the beginning hand made and was fashioned on the model of the earlier vessels made from natural objects such as gourds.

shells and horns. The neolithic phase is in abundance in Central and Southern India. Bellary is the real focus of the Neolithic culture in Southern India and is the richest region in prehistoric remains in the whole of India. The neolithic in India is dated between 6000 to 4000 B.C.

*The Bronze Age in Peninsular India :—*In all the earlier excavations of prehistoric sites in South India no copper or bronze objects were found either in association with or immediately after the late neolithic. The bronze objects known to us are those found in association with the pottery, beads and iron objects of the early iron age or megalithic burials as for example those from the urn burials of Adichanallur in Tirunelveli district and those from the cairns of the Nilgiris. This led to the view now discarded that the neolithic merged directly into the iron age without the intervention of a copper or bronze age. Recent finds of bronze objects in Maharashtra, Mysore and Hyderabad (1946) in strata antecedent to the Early Iron Age have now definitely established that these metals were being used for making tools when the use of iron was not known. The association of bronze objects with the last stage of the neolithic of Nasik, Brahmagiri and Kallur points to a phase during which stone implements persisted along with bronze tools as in the Indus Valley. Thus a copper or bronze age is now recognised in the prehistory of South India. At these sites copper objects like simple flat celts were found associated with microliths, painted pottery and sometimes polished stone axes. This crude and primitive chalcolithic culture of western, central and southern India does not appear to have any links with the chalcolithic of the Indus valley. It resembles the latter only in the occurrence of painted pottery, microliths and copper objects. The people of the chalcolithic phase of peninsular India lived in mud houses with flooring of some fibrous material mixed with lime. They buried their dead in urns fragmentarily. They possibly had defensive ramparts around their settlements.

*The Bronze Age of the Indus Valley :—*About five thousand years ago when Egyptians and Sumerians were building magnificent tombs and temples, but living in mud huts a highly developed urban civilization flourished in the Indus valley extensive remains of which have been found at various sites in Pakistan. Of these ancient sites two of the most well known are Harappa in the Punjab and Mohenjodaro in Sindh. At that time Sindh and Baluchistan had a heavier rainfall and supported

a larger population than they do now, and the original city of Mohenjo Daro was considerably larger than its present ruins which are about a square mile in extent.

The people of the Indus civilization lived in large cities with broad paved streets. Mohenjo daro reveals a definite scheme of town planning. Some of the streets are thirty feet wide and are aligned from east to west and north to south. There are large underground drains through which a man can walk erect. The commodious houses are built of dried bricks and mud plaster. They are two or three storeyed and have large courtyards. There are large baths. The people stored wheat in large pottery jars which they buried in the floor of their houses. The large bricks used for buildings, the pottery jars and even the wheat grains stored in them are among the exhibits.

The chalcolithic culture of the Indus valley is a highly developed urban culture with very wide ramifications. Its expansion is vouched for by the large number of Indus sites now excavated in India, viz. Rangpur, Bikaner, Rupar and Lothal.

The Indus culture was of the copper or the bronze Age. No traces of iron have been found. Copper and bronze tools existed side by side with stone tools. Characteristic exhibits of this civilization indicate the high cultural level of the people. They knew spinning and weaving, sculpture, bead making, working in gold, silver, copper, shell, bone, ivory and semi-precious stones like carnelian. Household articles are of earthenware, shell and stone. Pottery is wheel-made and well baked, and include both plain and decorated wares. The weights and measures are accurate and made of polished stone cubes. The smaller weights follow the decimal system and the large weights the binary system. The Indus valley people had a hieroglyphic, ideographic or pictographic writing which they engraved on square stone seals (Fig. 50). The Indus writing is said to be the parent of Indian Brahmi script from which most of the scripts of the present day Indian languages have had their origin. The mother goddess is prominent among the human forms of terra cottas while the animal forms include the humped bull, the rhinoceros and the unicorn. The predominance of ritual objects has led to the view that Harappa and Mohenjo-Daro were ancient ceremonial and pilgrimage centres like Mecca or Benares.

*The Iron Age in India:—*The iron age in India is believed to be of very great antiquity. Evidence of steel casting by the

crucible process is available in the Tiruchi district and it is perhaps noteworthy that many of our most primitive people knew the art of smelting iron. During this period wheel-made pottery had attained a very high degree of excellence and perfection. Most of our knowledge of the beliefs and practices in connection with the death rites of the ancestors of modern south Indians is derived from a study of iron age funerary monuments which abound all over the country. Among these are the large urn burials so characteristic of Tirunelveli and Coimbatore districts, the large pottery cists or sarcophagi of South Arcot and Chingleput districts, the dolmens of North Arcot district, the underground stone chambers of Mysore and the several types of burials such as rock cut tombs, hatstones and umbrella stones of Kerala. Along with the remains of the dead, various grave goods such as cult figurines, vases of pottery or metal, weapons, beads and ornaments of semiprecious stones, metal and shell were placed in the burials. The ancient beliefs underlying these practices survive in many current death customs, principally among the aboriginal peoples and the Iron Age must not be thought of as exclusively prehistoric, for it is also the age of the present time.

Urn Burials of Tirunelveli:—About twelve miles to the South east of Tirunelveli town on the southern banks of the river Tambarparani lies the world's largest burial ground covering over 114 acres. The urns buried in this region are large and pyriform in shape. Thousands of such urns were found buried each six feet apart and at the depth of three to twelve feet. Their contents are varied in form and constitute remarkable exhibits.

Among the ornaments were oval shaped diadems of thin gold plate ornamented with triangular and linear dotted designs. These types of ornaments called 'Pattams' were probably tied around the forehead of the dead. They are even to this day used in South Indian marriage ceremonial where they are tied round the foreheads of the bride and bridegroom as an indication of the married couple being vested with their new rank and status by the elders who tie them (Figs. 51 and 52). Other ornaments such as bangles, bracelets and rings are made of bronze, shell and bone. The bronze animal figurines include buffaloes, goats, cocks, tigers, antelopes, elephants and flying birds. (Figs. 53 and 54) - Very thin bronze sieve cups with perforations in the form of dots arranged in a variety of designs of concentric circles and semicircles were also found. These fit into thicker bronze

basins as lids. A number of bronze terminals consisting of of several branches each ending in a spherical or conical bud and interspersed with the forms of small birds or animals are probably ritual objects. The iron objects associated with the burials consisted of weapons and agricultural implements. These were placed around the urns pointing downwards as if they had been thrust in by the attendant mourners. The pottery consisted of the typical red and black ware so very characteristic of megalithic monuments in South India. Most of them were provided with ringstands while the pottery bowl with a conical lid often decorated with fine dots was the main type.

The human skeletons found in these burials enable us to understand the racial types of the population of South India over two thousand years ago. Of the several skulls discovered here two are Australoid, six Mediterranean and one Alpine in type, thus revealing the presence of most of the modern racial elements of the population at this period.

Sarcophagus burials of Chingleput:— There are a large number of rude stone monuments in the Chingleput district which have been excavated in recent years. The sites occur in the waste or rocky places which surround the hill ranges. Around the base of the hills the remains are placed a short distance from the bottom slopes, and usually consist of stone circles varying from eight to fifty feet in diameter, formed of rough stone boulders. In the centre of each stone circle is deposited either a pyriform urn or an elongated pottery cist. The deposits occur at a depth of two to seven feet below the surface. The cists or sarcophagi, several of which are exhibited in the prehistoric antiquities galleries of this museum are oblong in shape and rounded at the ends like bathtubs. They have hollow cylindrical legs in two or three rows. They are covered over with dome shaped lids. Similar sarcophagi found at Pallavaram near Madras had only two rows of legs. In addition to excarnated human bones the cists contained stone and iron implements, weapons, pottery, beads and chank shell ornaments. Exhibited in the same gallery are fairly large oval earthenware shallow saucers from Malabar, one of which is without legs and the other with very short legs. These appear to be ceremonial utensils in which funeral offerings were made. They represent stages in the evolution of the large type of earthenware cist or legged Sarcophagus of the Pallavaram type.

The Ram Sarcophagus from Cudappah.—At the entrance to the Adichanallur gallery is a very large earthenware sarcophagus dug up at Sankavaram in Cudappah District. This unique zoomorphic or animal-like sarcophagus depicts the head and body of a ram though it has six legs (Fig. 55.) This was obtained from an excavation conducted by this museum and had a number of megalithic pottery specimens and a few iron implements disposed around it besides the usual collection of excarnated human bones. Though this sarcophagus is unique it appears to be modelled essentially after the usual Pallavaram bathtub type of sarcophagus. The legs are in two rows, are higher and the dome is built in sections with a separate attachment for the head.

Cairns of the Nilagiris.—On many of the sacred hills of the Todas are stone circles. Each encloses a crude sort of grave surrounded by a cairn of the draw well type. These cairns were excavated by J. W. Brecks and his remarkable collections were catalogued by R. B. Foote for this museum. The pottery vessels consist of tall exotic looking tiered vases surmounted by domical lids. To the lids of these were attached crude and grotesque human and animal figures. The buffalo is the predominant animal type and many of the human figures are equestrian (Fig. 56.) Another type of pottery is the round bottomed jar with incised or punch-marked designs. The iron objects include arrow heads, pikes, lancepoints, billhooks, spearheads, chisels, daggers, bells, a lamp, a rattle, a shearer and a spade. The copper objects include bangles, rings, collyrium rods, a sword guard, the carved pommel of a dagger and a vial. The bronze bowls are very elegant and artistically made. One of them is an exquisite oval bowl decorated with lotus patterns, flutings, buds and fronds. This fine bowl stands on a pedestal. It resembles a gold bowl from Ur, circa 3500 B. C. Other bronze objects are a censer with a central rod and decorated rings. A curved hone, a mace head and some pumice stones are the stone objects among the specimens. The beads are of agate, carnelian and gold. The carnelian beads are etched, the agate beads cylindrical and the gold beads round.

Megalithic cist of Brahmagiri.—A model made in this museum illustrates a megalith excavated at Brahmagiri in Mysore. This is the typical stone cist burial known as a port-hole cist constructed in this manner. A pit was dug and lined with four roughly trimmed rectangular slabs 5 feet by 6 feet in

a svastika pattern locking the four sides to prevent falling in. There was a floor slab on which the four upright slabs rested. The top of these was covered by a massive capstone. The upright slab on the eastern side has a circular porthole about 2 feet in diameter. The funeral pottery, iron objects and beads were introduced through the porthole and lay on the floor slab. This was filled up to 6" with earth over which the exhumed long bones and skulls were introduced so as to be in the centre. Along with the bones a few pots were put in. The earth was put in through the porthole which was then closed and the entrance walled up. The stone cist was then surrounded by one or two circular or oval dry stone walls. The top of the cist rose 3 feet above ground level and was heaped up with earth and small stones. Large stone boulders about 4 feet in diameter were put in to form the stone circle which is about 20 feet in diameter. The stone boulders lie more than half buried in the ground.

*The rock cut caves of Fernke, Malabar:—*A stepped rectangular pit is dug out into the lateritic rock. In the straight face is cut a rectangular entrance above floor level of the quadrangle. Through this the cave is hollowed out. The floor of the cave is circular and its roof dome shaped (Fig. 57). The cave is a hemispherical chamber in which pottery, especially the four footed urns, beads, iron implements and human relics are deposited. Raised platforms are cut out of the rock on the sides of the cave. There is an upper opening plugged with a piece of granite and a side opening from which a flight of steps leads to the surface. The entire tomb is surrounded on the surface by a stone circle.

The iron age burials of India have certain common features which are characteristic of the megalithic culture. The use of iron implements and wheel made pottery of a peculiar red and black ware are characteristic of the megalithic age. The burials with which the megalithic monuments are associated are secondary, fragmentary and collective burials. Stone circles or dolmenoid cists are associated with these monuments though they are not seen in the case of the urn burials of Adichanallur.

*The Brahmagiri cultures:—*The succession of three cultures found at Brahmagiri are 1 (a) crude chalcolithic culture (2) a megalithic culture and (3) the Andhra culture.

The chalcolithic culture extends from the first millennium B.C. to the beginning of the 2nd century B.C. Polished stone axes, blades, points and coarse hand made pottery are characteristic of this culture. A few copper and bronze objects were found in a lower layer of this culture. The stone axes are made of trap rock, polished and have pointed butts and oval cross section. Microliths of jasper, flint and agate were also found with the stone axes. The pottery is of a coarse grey fabric and consist of globular vessels. Painted and incised potsherds were found in the lower layers. Rectangular houses built of timber and burials were also associated with this culture.

The second megalithic culture from 200 B.C. to the middle of the first century A.D. introduced iron working. This is indicated by the occurrence of large numbers of iron sickles, knives, swords, spears, arrowheads and wedges. Polished stone axes and microliths continued to occur occasionally as survivals of the earlier culture. The pottery distinctive of this period is polished, black or black and red and had been turned on a slow wheel. Houses continued to be built of timber. The megaliths of this period are of two kinds (1) the cist burial and (2) the pit circles. As an example of the former the porthole cist of Brahmagiri a model of which is exhibited has been described earlier

The third Andhra culture extends from the middle of the 1st century A.D. to the 3rd century A.D. and is characterised by the occurrence of pottery with a criss-cross pattern of decoration. The pottery of this period is turned on a fast wheel and is sometimes salt glazed. In the lowest layers of the Andhra culture occur pottery of the rouletted ware. Glass bangles appear for the first time at this period.

The Roman in South India: —A good number of Roman and Venetian coins from treasure trove finds in South India testify to the extensive trade relations which ancient India had with Rome and Venice. Excavations at a site near Pondicherry called Arikamedu have shown that these contacts were at their zenith in the first centuries B.C.—A.D. when Rome and other western nations imported textiles, indigo, spices, shell ornaments and beads (Fig. 58) of glass and precious stones from South India and not only paid for them in gold but also exported to India Mediterranean wine in large two-handled pottery jars called amphorae. The Romans like the Portuguese, Dutch, French

and English empire builders who came later, established their settlements and factories in the coastal towns of India and had wide commercial relations with India. Arikamedu is also noted for being the site where the earliest writing in the Tamil language was discovered on potsherds. Again the archaeological map of South India began to shape with dating of the indigenous pottery of Arikamedu with which imported Italian pottery of known date occurred. The establishment of the date of Arikamedu and its similarity to the cultures of Brahmagiri and other sites enabled the dating of these sites.

The cultural history of India from the Buddhist period beginning with the middle of the first millennium B.C. to the middle of the second millennium A.D. is represented in this museum by coins sculptures in bronze and stone, and copper plate charters. Descriptions of these world famous antiquities are given under the archaeological and numismatic sections of this book.

Arms of the Historic period :—The front building of the museum houses the museum theatre in front and the Connemara Public Library behind. The prehistoric antiquities of the stone and iron ages are housed on the ground floor in the right wing of this building while on the left wing are housed the arms of the historic period. At the entrance to these wings is a very long row of spears from the Tanjavur armoury arranged against the wall. There are also two huge bronze bells from China, brought as trophies of the notorious opium war. At the entrance to the arms galleries are on view a varied assortment of helberds, pikes, spears and a set of Spanish plate armour from Manilla. The arms collections of this museum are arranged in two rooms while a number of huge cannon are displayed around the front building. These cannon were obtained as trophies from Manilla, Mysore and Tarangambadi.

In the first arms room are ancient matchlocks, musketoons, hand guns, blunderbusses, rifles and pistols used by the English East India Company or captured by them as war trophies. Two guns richly inlaid with gold which are exhibited in special cases are those which were presented by the English East India Company to Sarfoji Maharaja of Tanjavur. A set of artistically engraved powder flasks is an attractive exhibit. A series of battle axes, arrows, and chain shot are fixed to the wall. Some Chinese helmets and a few stone shot are exhibited in special cases. On

the floor of this room can be seen a number of cannon, mortars, wall pieces, grape-shots and some coats of mail armour. Of these a large breech loading cannon is a unique exhibit. Some of the miniature models of mortars and cannon are also of interest.

In the second arms room a very large and varied collection of ceremonial and lethal weapons obtained from the Tanjavur armoury are exhibited. They include swords, daggers, maces, elephant goads, choppers, knives, shields, spears, bows and arrows. (Fig. 59.) Several of these weapons have exquisitely carved designs of yalis, makaras and parrots on them. Among the cannon exhibited here are two very old ones which represent the earliest method of cannon manufacture. Longitudinal strips of iron are arranged inside a series of circular iron loops and the whole is welded together. Other interesting weapons in this series are the reversible steel bows and the signed arrows of the Maharaja of Tanjavur and the Bag Nak or the tiger claws, a type of weapon which could be concealed in the palm and which was used by Shivaji against Afzal Khan.

Lithnographical collections of South India:—Illustrating the way of life and the material culture of the primitive people of South India are the ethnographic collections first acquired for this Museum by Dr. Edgar Thurston when he conducted the State Ethnographic Survey from 1894 and published his outstanding pioneer work "The castes and tribes of Southern India" in 1909. These have been augmented considerably by subsequent ethnographers and are exhibited mainly in the first floor galleries of the front building which also houses the large collections of South Indian bronzes, metal ware, wood and ivory carvings. The ethnographic collections are now highly representative of the material culture of most of the South Indian tribes such as Todas, Kotas, Mannans, Muthuvans, Kanikar, Chenchus, Lambadis, Saoras, Khonds, Koyas, Gadabas, Kurumbas, Irulas and Malasars. These include wearing apparel ornaments implements of collecting, hunting and agriculture, devices for making fire, musical instruments and cult objects. Other collections include writing materials, musical instruments, votive offerings, figures used in sorcery, shadow play and the Kathakali dance drama.

South Indian Tribes:—The primitive peoples of Southern India illustrate different levels of cultural and social organization such as the simple food gatherers and hunters, the pastoral

peoples with their flocks and herds, the tribes given to shifting cultivation variously styled as podu, kumari and punam and those tribes who have taken to settled agriculture.

The *Kadar*, of the Anamalai hills in Coimbatore (Fig. 60, 61) are the oldest inhabitants of India. They exhibit a negritoid or pygmy racial strain. Their population is about 700. They are fast dwindling in numbers. They speak a corrupt form of Tamil mixed with a few Malayalam words. Their social life is based on a simple food gathering economy. They know no agriculture and have no domestic animals except the dog. They dig up edible roots, collect honey and minor forest produce, track elephants and are experts in tree climbing. The Kadar have many interesting customs. Among the exhibits are some of the exquisitely carved bamboo combs, one of which every Kadar man has to make and present to his wife on his marriage and which the woman wears in her head hair. Similar bamboo combs are used by the negritos of New Guinea and some of these form an interesting exhibit. The practice of tooth chipping by which both men and women, when they come of age, have their front teeth filed or chipped into pointed cones to enhance their beauty is another custom which is also practised by the Malavedars. (Fig. 62) Yet another custom is their observance of mother-in-law avoidance.

*The Hillmen of Kerala:—*These include such tribes as the *Kanikar*, *Mannan*, *Muduvan*, *Male Arayan*, *Ulladan* and the *Pulaya*. They are mostly hunters and shifting cultivators. They build huts of bamboo and leaves and most of their household utensils are of bamboo. They use pellet bows and some of them are blunt, which are used for stunning birds and small animals. These do not have iron points. They have digging sticks of wood and use the bow type of rat traps. Besides coloured glass beads and base metals these tribes use coconut shell and rattan fibres for making ornaments. Like the Kadar they build rectangular houses which are sometimes erected on tree tops. The Thanda *Pulaya* have a peculiar custom. When a girl comes of age she is invested with an apron made of a sedge or reed called *Thanda* (Fig. 63) The *Ulladans* are the only tribe who use the cross bow with the trigger release. This type of bow naturally leads to the harpoon and the harpoon arrows or darts which are made in such a way that the entire arrow with hooks or barbs in the harpoon or the front end of the arrow is detachable and after striking the quarry remains fixed to it. Another weapon

used by some of the Kerala tribes for hunting small animals or spearing fish is the blow tube or blow gun. This is used with darts propelled by blowing air with the mouth. Blow guns are also used by the Senoi Sakai of Malaya and the Kenyakedda tribes of Borneo with poisoned darts.

Among the people of the Nilagiri hills the *Todas* are the most unique tribe living with the Badagas, Kuzumbas and Irulas. The *Todas* are a decadent pastoral tribe tending buffaloes and living on their dairy produce. (Fig. 64.) They live in half-barrel-shaped dwellings. They are the only Indian tribe known the world over on account of some of their past customs like female infanticide and fraternal polyandry. The *Toda* men are tall and handsome with aquiline noses and clear cut features while their women are plain with infantile features. The men are good at carving wood, especially making walking sticks. The women embroider their garments or mantles. These are called 'Putkuli'. A model of the half-barrel shaped dwelling of this tribe together with the heavy brass ornaments, the ceremonial clubs, and imitation buffalo horns which are burnt at funerals, and purses and boxes decorated with cowry shell, are exhibited. Of the several husbands of a *Toda* woman, the one who presents her with a ceremonial bow and arrow during her pregnancy rite is considered to be the father of her child.

The *Kotas* are the artisan tribe of the Nilagiris. Their population is about 2000. They work in gold and silver, and are carpenters and blacksmiths, tanners and ropemakers, umbrella makers, potters and musicians, and at the same time cultivators of the soil. (Fig. 65.) They were considered to be untouchables by the *Todas* as they are beef eaters. The *Todas* are vegetarians and the buffaloes they sacrifice at their funerals are given away to the *Kotas*. The *Kota* collection in the museum include a small turntable type of potter's wheel called 'tournette' with its accessories, iron implements like axes, adzes and ornaments like bangles and bracelets. The *Kotas* resemble the *Todas* in physical type as well as in some of their social practices like fraternal polyandry.

The *Kurumbas* of the Nilagiris and Malabar are shifting cultivators, the *Kurumbas* of Mysore and Bellary are shepherds, the *Kurumbas* of Wynaad are hunters and nomad agriculturists while the *Urali Kurumbas* work in metal or make pottery. The *Kadu Kurumbas*, the *Jen Kurumbas*, the *Vellu Kurumbas* are

other groups who are more primitive in that they collect honey and forest produce and hunt for their living. They speak Tamil, Canarese or Malayalam according to the region they inhabit. The *Urali Kurumbas* of Wynad are interesting in that they represent the only tribe in South India who make hand made pottery by the scooping method.

The *Irulas* are a dark skinned platyrrhine tribe inhabiting Malabar and the Nilagiri districts. They work on plantations or collect forest produce. (Fig. 66.) In South Arcot, North Arcot and Chingleput they are more civilised though they constitute the most backward groups and are given to menial occupations. The Irula of Malabar make fire by wood friction or flint and steel, catch rats in bow traps and are especially fond of the flesh of the black monkey. The Irulas resemble the Enadis and Chenchus of Andhra in that they are emerging out of their tribal life in the jungles and forests and are taking their place among the civil population.

The *Malasars* or *Malai Malasars* of Coimbatore are another typically Australoid people living on the Anaimalais like the Kadar whose dominion extends into Cochin. The Malasars are employed on plantations. They are good trackers and trainers of wild elephants like the Kadar. They are a very backward tribe and occupy a very low position in society, as they eat carrion. Their population is about 10,000. They resemble the Kadar in their physical type being short in stature and dark in colour. A collection of the simple ornaments made of brass and other base metals of this tribe are exhibited.

The *Chenchus* are a primitive Telugu speaking tribe of the Nallamalai hills of Andhra Pradesh. (Fig. 67.) They have a food gathering economy and are expert hunters. They are now slowly taking up agriculture. They build circular huts with conical roofs of the beehive pattern. They use flint and steel for making fire. The Chenchus are Australoid in physical type having dark skin colour, prominent eye brow ridges, long heads and medium stature. They are allied to the Enadis and Irulas. (Fig. 68.)

The *Lambadis* are a large picturesque tribe who are found throughout Deccan though most of them are found in Andhra Pradesh, especially in Telangana. (Fig. 69.) They are also called Banjaras and Sugalis. They are tall, fair-complexioned

have aquiline noses and classical Nordic features. They are good agriculturists and excellent cattle breeders. They served as the commissariat of the Moghul armies. Lambadi women wear heavy, cumbersome ornaments, and beautifully coloured garments decorated with pieces of stone, cowries and bits of mirror glass, the last of which is becoming the rage of fashionable women all over the country. A model of a Lambadi woman with her picturesque dress and ornaments is one of the most attractive exhibits of the museum.

The *Gadabas* are an agricultural tribe of Ganjam and Vizagapatam Districts. They were formerly employed as palanquin bearers and plantation labourers. Their population is about 30,000. They speak a Mundari language and have dark skin colour and Mongoloid features. The women have infantile features and wear picturesque dress and ornaments. The Gadaba woman's dress consists of a narrow fringed loin cloth and a similar upper cloth both woven out of bark fibre yarn dyed in bands of red, blue and white. (Fig. 70.) Their ornaments consist of large coils of brass wire for earrings, numerous strings of coloured glass beads, bangles, bracelets, anklets, finger and toe rings besides necklaces of shell, cowries, metal and glass beads and bead head bands. The women prepare and spin yarn from the bark fibres of a number of wild plants (*Ficus glomerata*, *Calotropis gigantea* and *Holarrhena antidysenterica*) dye the yarn red with the seeds of the Jabra (*Bixa orellana*) and blue with indigo, and weave it on primitive handlooms. A Gadaba girl is considered fit for marriage only when she knows how to spin yarn and weave cloth from bark fibre. The Gadaba woman wears a bustle or figure improver of black cords at the small of her back in addition to her gay and simple garments and lavish ornaments.

Gadaba life is centred around their villages to which the people are very much attached. They live in beehive type of huts. They practice both hill cultivation with hoes and terraced cultivation with ploughs besides hunting and fishing.

The Gadabas have a patrilineal social organization. They practise clan exogamy and have totemistic phratries. They have dormitories for the unmarried young of both sexes. They have a democratic form of Government in which the headman sits in council or panchayat on stone seats (sodor) and dispenses justice. (Fig. 71.) They have a hunting feast in March-April and worship Hindu gods and goddesses to some of whom they offer buffalo

sacrifices. Their male dead are cremated while women and children are buried. They erect stone monuments over the graves of the dead. A plaster cast model of a Gadaba woman with her dress and ornaments is exhibited together with some of the ethnographic materials illustrative of Gadaba culture.

The *Khonds* of Ganjam, Orissa, are hunters and shifting cultivators. They are a very large tribe speaking a Dravidian language. They used to sacrifice human beings in honour of their Earth Goddess or Tara Pennu. A large wooden post found at Baliguda in Ganjam district is the only exhibit in this museum reminiscent of this practice. (Fig. 72.) The sacrificial victim was dedicated, purchased or captured. He was anointed with oil and turmeric and tied to the cross piece of the post which represented an elephant. This used to be whirled round and round the upright post. Men and women danced and sang around the victim who was drugged and intoxicated. He was then battered to death and hacked to pieces. Every Khond took a piece of the victim's flesh and buried it in his field to ensure good crops and avert evil. When the practice was prohibited in 1845 the Khonds took to sacrificing goats and buffaloes.

The Khonds have ceremonial objects of a wide range among which the cobra, the tortoise and the tiger represent some of their totems. These fine series of brass images of animal and human figures are worshipped and carried in front of marriage processions. The Khonds practice different forms of marriage such as marriage by service with the bride's parents, by mutual consent, by elopement, by ceremonial capture of the bride or by selection from the Dangadi Basa or virgins' hall. Like most aboriginal peoples divorce and the remarriage of widows are permitted and the junior levirate by means of which a widow marries her deceased husband's younger brother is practised. The dead are cremated and funeral feasts are held. The bison hunt dance, a characteristic feature of this tribe, is represented by men wearing the head dress of bison horns and peacock feathers (Fig. 73). The men use bows and arrows and battle axes in their hunting. Dress and jewellery are represented by leaf aprons and bark fibre clothing and heavy brass bracelets, anklets, rings and combs.

The *Saoras* are a Mundari speaking tribe inhabiting the Ganjam and Vizagapatam districts. Their population is over 200,000. They are medium statured and dark skinned with marked Mongoloid features. They have flat faces, thick lips,

broad and flat noses, high cheek bones and markedly oblique eyes. The women have a typically heart-shaped face while the men show superb muscular development (Fig. 74).

The Saoras are a timid tribe and avoid contacts with strangers. They live in rectangular houses built in parallel rows which present an orderly appearance in the jungle. Saoras practise both hill cultivation and terraced wet farming, collect forest produce and even migrate to the tea plantations of Assam as labourers. The men hunt with bows and arrows and use battle axe called the Tangi. Being an artistic people with a wealth of ornaments and musical instruments, they are given to song, dance and drink on festive occasions. Marriage is preceded by a ceremonial capture of the bride. The Saoras have a shamanistic religion and sacrifice pigs and fowls on all important occasions. The dead are cremated and stone monuments erected in their honour. Buffaloes are sacrificed at funerals and feasts held.

The Saora ethnographic materials include a collection of musical instruments of which there is a wide range, a number of ornaments including anklets, armlets, head bands, ear pendants, plumes for head dress, nose rings and finger rings, a number of bows, arrows and the tangi or their characteristic battle axe, knives, seed drills, baskets and calabashes, smoking pipes which are usually carried stuck in the head hair by men and women, and a number of cult figures of wood representing parrot, monkey, man, etc. A hut model represents the rectangular type of dwelling of this tribe.

The Koyas the southern most branch of the great Gond tribes number over 95,000 and inhabit the Godavari, Vishakapatnam and Srikakulam districts of Andhra (Fig. 75 & 76). Their language varies from Kui in the north to dialects of Telugu in the South. Though hill cultivators the Koyas plough the land they cultivate. They have occupational groups among them. They celebrate every harvest by a festival. They are good at hunting. Feasting and drinking are common at festivals and their bison dance is famous. The Koyas have a democratic form of panchayat raj in which the headman in council settles disputes. Koya social organization is characterised by clan exogamy and kin marriage. Marriage rites include the ceremonial capture of the bride and the pouring of water on the heads of the couple from a gourd bottle. The Koyas cremate their dead, erect monuments over their graves and worship ancestral and Hindu

gods. Koya ethnographic materials include bows and arrows bison horn head dress with peacock feathers, a drum used in the bison dance, a bird trap and a gourd water bottle.

Australian Tribal culture:—The Australian Aborigines live the life of nomad hunters in a hostile desert environment. (Fig. 77). They are said to have migrated from Asia about ten to twenty thousand years ago. Ever since their discovery by the European colonists they have always refused to accept civilization and have gone deeper and deeper into the desert where they eke out a very precarious livelihood. Their population at present is about 50,000. They are constantly on the move in search of food. They hunt and kill animals with wooden spears and boomerangs and besides these live on grubs, and collect grass seed which they grind and bake into bread. They have no regular dwellings except wind breaks and rock shelters. Men, women and children practically wear no clothing in spite of the cold. They use kangaroo hides to protect their children

In physical type the Australians resemble the aboriginals of Southern India who are therefore said to be Australoid. Tall and well built, they have prominent eyebrow ridges, broad flat noses, thick lips, dark skin colour, curly hair and excess of body hair.

Their material possessions are boomerangs, spears, digging sticks, food bowls and a few skins or hides. They make and use blades and knives of stone, porcelain or glass pieces. *Tjurungas* are the most sacred and secret possessions of the aborigines in which lie the mystery of their initiation rites. The tjurungas are of wood and stone. They are oval objects on which are engraved a number of circular designs which represent the history of the tribe. The spirit of the tribe resides in the stone tjurungas which are kept in secret places known only to the elders. Tjurungas made of wood are commonly known as *bull roarers*. The bull roarer is a flat oval piece of wood tapering at both ends. It swings from a string of vegetable fibre or human hair. It rotates on its own long axis and at the same time whirls round producing a booming noise. This noise is the voice of the spirits. The bull roarer is used in the initiation of boys. Women and uninitiated boys have to keep away from these ceremonies on pain of death. The elders who perform these ceremonies subject the initiates to very painful rites. The strong men of the tribe pour their blood over the boys to give them strength to bear

hardships. The boys undergo a drastic change from boyhood to manhood. In a tense atmosphere heightened by the booming of bull roarers they learn of the creation of the world, the origin of their tribe, the religion and the way of life of their people. Painful inflictions such as knocking off of teeth, circumcision and emasculation with stone blades teach them not to forget the lore of the tribe which they had gained under such a tense atmosphere.

Boomerangs are of two kinds. The longer ones used in war are of the non-returning kind. The smaller ones which return when thrown are used in hunting. Boomerangs of the returning type are also found among many South Indian peoples like the Maravar who excelled in their use. One type of Australian boomerang used in war is peculiar. It has a recurved hook which sticks on to the victim when thrown.

Spear throwers are mechanical contrivances which enable the aborigine to increase the reach of his arm. The spear thrower has a peg which fits into a socket at the end of the shaft of the spear. Both spear and spear thrower are held in the hand and the spear is hurled by releasing it after aiming and swinging the arm to the front. This device is based upon the great ingenuity of the aborigine. When similar devices were first discovered in archaeological excavations archaeologists were unable to identify them till they were found in actual use by the Australian aborigines. This is one of the earliest instances of the past living on into the present in the lives of the primitive peoples of the world. Here the interpretation of the archaeological problem is based on ethnographic survivals. And it is said on the basis of this and similar findings that the Ethnologist is one who catches his Archaeology alive. Another illustration from the Australian aborigines of the past living on into the present is seen in their use of stone tools which they continue to make and use as our palaeolithic, mesolithic, and neolithic ancestors did thousands of years ago. The stone tools which form a unique exhibit include not only tools made of quartzite, chert and flint but also those made of porcelain and bottle glass which are new materials used for making tools in the ancient tradition.

American Tribal culture:—The Eskimos are a mongoloid people with short stature, stocky build, swarthy skin colour, straight black hair and somewhat slanting eyes. They number about 33,000 and inhabit the Arctic wastes of Greenland and North

America and the Asiatic coasts of the Behring sea. Living under the most unfavourable conditions they have developed a high degree of skill and ingenuity in making use of their limited resources such as the animals they hunt and the drift wood they collect for all their material needs.

Among the Eskimo material exhibited are the following: A bird bola made of six walrus ivory balls; cord and feather shafts for trapping birds; an Eskimo woman's knife made of steel with a handle of bone and ivory for general use; a harpoon point made of iron set in a bone shaft; a seal dart made of bone, wood and hide; a spear thrower made of wood and bone; snow goggles made of wood with a long slit for the eyes to prevent snow blindness; a scraper of stone set in a carved wooden handle for a left handed person; a needle case made of a bone tube inside which the stout copper needle is stuck on to a piece of hide and which is held on either side by bone balls. Most of the American Indian materials exhibited belong to the North American Indians. Among them is a wooden mask used by the Haida Indians of the North West coast, who are well known for their potlatches or ceremonial distribution or destruction of property which they amass by industry and thrifty living, two pairs of moccasins or snow shoes made of soft leather with very fine beadwork on them, a beaded leather bag, a leather cradle board cover with fine beadwork all belonging to the Sioux Indians, a beaded pouch of the Cheyenne Indians, a dish of cedar wood with painted crests representing the beaver and the raven of the Kwakiutl Indians, a wooden mask with black fur and tin eyes of the Iroquois Indians who were well known for their great confederacy of the Five nations and the legend of Hiawatha immortalised by Longfellow; a fish hook of the Kwakiutl Indians of the North West coast of America for catching halibut which is a very interesting exhibit in having a human face carved on it, and a horn spoon of the Tlingit Indians of the coast of Alaska.

The American Indians are noted for their totemism and clan exogamy. Descent is reckoned in the female line and land belonged to the tribe as a whole while families who cultivated plots had a prescriptive right to their ownership. Marriage was by bride purchase while the young of both sexes had to undergo painful initiation rites on coming of age. Their religion was one of propitiation of natural spirits by their *shamans* or medicine men. The ceremonial burial of their dead with grave goods to accompany them to the spirit world was the result of their belief in a future life.

The American Indians in the United States number about 400,000. They live mostly in reservations. They were given to hunting, fishing and slash and burn agriculture. Inter tribal feuds and wars, scalping and other forms of carrying war trophies are things of the past. Their housing system shows high technical skill and variety. The *tipi* is a conical tent on three poles covered with skins or mats, the *wigwam* is a dome-shaped bark or mat-covered house and the long house of the Iroquois Indians is the most advanced type, 50' to 100' in length accommodating about ten families. These long houses were decorated with totems like beaver and raven carved in wood. Their artistic tendencies find expression in fine designs on pots, baskets, bags, cloth and jewellery. The moccasins and leather bags, pouches and cradle board covers exhibited are fine examples of their art.

The American Indians are Mongoloid in racial type with copper brown skins, dark eyes, prominent and high cheek bones, but very often with aquiline noses. Their hair is coarse and black but they keep their broad faces smooth. (Fig. 78) There is, however, considerable variation from tribe to tribe. Though the Negroid, Mongoloid and the Caucasoid groups have remained in an apparent state of isolation in America as the Negro, American Indian and the White population they have been subject to slow miscegenation and evolution into the new American nation with a characteristic American culture.

Illustrations of the way of life of the Australian Aborigines, the Eskimo and the American Indians show that these peoples have remained isolated and at a level of culture far below that of civilized peoples. Active interference with their way of life in bringing them into the fold of civilization have been followed by disastrous results. The tribal peoples of India have fared better in this regard in having had a very slow and gradual contact with civilization.

Human Biology :—An introductory set of exhibits illustrate the evolution of man. This consists of the skulls of the man-like apes and plaster cast restorations of the skulls and reconstructions of the brains of the races of early men like *Pithecanthropus*, Neanderthal and Cro-Magnon men. The races of mankind are represented by skull types representing Mediterranean, Mongoloid, Negroid and Australoid peoples. (Fig. 79). Included in this set is a cast of a Vedda face in which the Veddid or Australoid type is seen at its best. This is the most predominant type in the aboriginal population of Peninsular India being characteristic

of the Bhils of Bombay, the Gonds of the Madhya Pradesh, the Chenchus of Andhra Pradesh, the Malasars of Coimbatore and the Panyans of Kerala. The Veddas, a primitive tribe of food gatherers and hunters living in small family groups in rock shelters in Ceylon are fast disappearing.

Folk Arts & Crafts:—Other ethnographic collections include primitive devices for making fire, jewellery, musical instruments, writing materials, objects used in ritual, worship and magical practices such as sorcery or witchcraft, votive offerings and toys representing mythological stories and characters like Yama's durbar, the churning of the ocean of milk and the avatars of Vishnu. Toys which are representative of folk art include the Tanjavur and Kondapalli toys (Fig. 92), the brass images of the Bhuta shrines of Canara, the brass figures of the Khonds of Ganjam, the wooden and clay figures of the sea fisher folk of Orissa, and the clay figures of Gramadevatas of Tanjavur. (Fig. 80) Other unique exhibits in this series are the Kathakali figures and the Pavalkothu of Kerala and the Bommalatta of Andhra.

Fire making implements:—The making of fire by wood friction or by percussion of flint and steel is common among most tribal peoples. Wood friction is made use of to make fire in three types of implements. There are the fire drill, the fire saw (Fig. 81) and the fire piston. The simpler type of fire drill used by the Nayadis of Malabar and the Yenadis of Andhra works by the twirling method. (Fig. 82). There are two long slender pieces of wood one of which has a series of cylindrical depressions scooped out on it and into one of these pits the rounded end of the other stick fits in and twirls. The first piece is held on the ground horizontally with the sockets facing up in between the operator's feet while the other piece is held vertically in one of the socket and twirled by the operator using both his palms. Some fine vegetable floss is used as tinder and this is kept in a hollowed out palmyra shell. In the other type of fire-drill both the pieces are stout and massive. The vertical piece is ribbed like a carpenter's drill and is rotated by churning it with a rope. The horizontal piece is held on the ground by one of the operators, who also holds the vertical piece firmly in position by a cup made out of the half of a coconut shell while the other person churns with both his hands. The fire piston in which fire is produced by the vigorous compression of air is used by some of the tribes of Malaya. A number of iron fire pistons are among the collection of iron objects excavated from Adichanallur in Tirunelveli district. Rice husks used as tinder was found inside

one of the fire pistons. The more common method of making fire among primitive people by striking stone pieces such as flint or quartz with steel is still met with among many primitive peoples like the Muduga of Kerala.

Jewellery:—The museum collections of jewellery both rural and tribal, exhibit a wide variety of designs and materials. The Kadar have ear discs of wood and pandanus leaves and make decorated bamboo combs. The highly bejewelled Lambadies have several anklets, armlets, bracelets and necklaces made of brass and ivory. The ornaments of the Todas include massive bracelets, anklets and chains of brass. They also have tassels fringed with cowry shells. The Kotas have varied ornaments of iron. Coloured glass beads, wood, fibre, coconut shells and bamboo are some of the materials which are largely used in making tribal jewellery. The Cherumas and Paniyas of Kerala and the nomad Koravas wear coloured glass bead necklaces in profusion. Jewellery of base metals like aluminium and brass are common in the form of necklaces of beads or kassus, anklets, bracelets, and necklets among several rural and tribal folk like the Malasar of Coimbatore and the Muduga of Kerala. Though tribal jewellery consists at best of cheap trinkets, it is important in giving the tribesmen scope and outlet for the expression of their artistic talents and workmanship. On the other hand, rural and urban peoples wear jewellery of gold, silver and precious stones in which they invest their savings. The peasant jewellery collections of this museum vary in their designs, styles and even materials according to the castes concerned and the regions in which they live. Thus the Moplas of Kerala wear mostly silver jewellery consisting of necklaces, waist bands and chate-laines with numerous pendants. The jewellery of the Nambudri Brahmans and the Syrian Christians which are worn mostly on ceremonial occasions such as marriages have much in common between them.

Writing Materials:—The art of writing on palm leaf cadjans with steel styles is very ancient and the entire written records of Indian literature at least during the last two millennia were written and preserved in this manner. There are also some documents written on bamboo pieces. Bark paper and linen books have been used as substitutes for paper. The linen is blackened with charcoal paste and written on with soapstone pencils.

The large collections of steel styles in this museum includes many artistic forms and in some of them the style and knife for cutting palm leaves are combined into one piece.

Musical Instruments :—A representative collection of the principal types of musical instruments common in Southern India are classified under the stringed, wind and percussion types and exhibited. Among these are the following unique exhibits. The ancient *Yal* (யல்) described in Tamil classical literature had disappeared from Southern India long ago. Its modern representative is the *Burmese Harp* or *Saun*, a stringed instrument which has a boat-shaped resonator and resembles the lyre. (Fig. 83). Another rare musical instrument is the *Pancha-Mukha-Vadyam*, a huge bronze drum with five faces which is used in temple music. (Fig. 84). Yet another exhibit which is becoming popular at the present day is the *Villadi Vadyam*, a long bow with about a dozen bells attached to it and played by a number of men to the accompaniment of a pot drum. The *Pulluvan Kadam* is used by the medicine men or soothsayers of Kerala in their invocation of the serpent God called '*Pamban Tullal*' (Fig. 85).

Votive Offerings :—An over-sized pair of leather sandals made and offered by the Madigas or Telugu cobblers to the god Sri Venkateswara of Tirupathi is prominent among the votive offerings. Other silver pieces offered to gods and goddesses in fulfilment of vows and as thanks giving offerings for recovery from serious illness, take the form of the part of the body affected. (Fig. 86). These are offered at important Hindu, Muslim, and Christian shrines in India and abroad. Brass or clay figures of the tiger, leopard, elephant, boar, etc., are offered to gods and goddesses in Bhuta shrines in South Canara to protect crops and cattle, and to prevent or ward off epidemics (Fig. 87).

Sorcery Figures :—The Moplah sorcerers of Kerala are considered to be experts in such practices as casting out evil spirits. When a woman is possessed by an evil spirit, the sorcerer transfers the spirit by means of incantations to an image of the woman made of wood. The spirit is then secured to the wooden image by driving nails into it. It is then cast into the sea. Such figures (Fig. 88) have been washed ashore on the coast of Kerala, three of which are exhibited in this museum. One of them is a female figure incised on a flat wooden plank. Of the two others in the round, one is a large life-size female figure studded all over with nails and the other a very small dwarfish figure.

Kathakali Figures :—The celebrated dance drama of Kerala is illustrated by a set of the four principal character types which portray the leading roles. (Fig. 89). The first of these is the

sedate character, *Pacha* (Green) of the great epic heroes like Dharmaputra and Arjuna who conform to the Apollonian way of life. The second *Kathi* (sword) is the more imperial and royal character who is egocentric and megalomaniac in nature like Ravana and Duryodhana. The third *Thadi* (beard) is the character of the terrific demoniac role of the classical villain of the drama represented by such examples as Bakasura, Keechaka, or Dussasana. The fourth character *Sbi* (Woman) simply represents one of the royal ladies such as Damayanti or Rukmani whose character roles are almost quite uniform so as to conform to a single type. These figures depict the actual costumes and make up of that principal characters of the dramatic art of Kerala.

Shadow Play Figures :—The main dramatic entertainment in the South Indian village before the advent of motion pictures was the shadow play drama comparable to the puppet shows like Punch and Judy of England. This old fashioned theatrical show was probably introduced into Malabar from Tanjore where the art of puppet figures in the round still survives. Here epic stories are dramatised and the characters are represented by flat leather figures, the sharp black and white shadows of which are thrown on a screen illuminated from behind. The figures are cut and punched out in silhouette, and attached to slender stems by which they are held and manipulated by the performers who stand behind the lights. The dramatic effect is heightened by a running commentary or dialogue kept up from behind the screen. The Kerala shadow play art is called *Paraikoothu* (Fig. 90). The *Bommalata* figures of Andhra are made of thin parchment and are very beautifully coloured and they depict in our collection some of the principal characters of the Ramayana and the Mahabharata. (Fig. 91). The Wayang Orang of Java which is grotesque and exotic is said to show influences of the South Indian art which has wide ramifications. A further addition to this collection are some very remarkable shadow play figures from Indo-China depicting such scenes and characters as the Temple at Angkor Vat, Kumbhakarnan, Thadagai, Jadayou, Apsarastris and a Maharishi. It is interesting to note that this art extends also to China.



Fig. 47. FIRST PALAEOLITH FOUND
IN-SITU BY R. B. FOOTE (1863)



Fig. 48. PALAEOLITHIC STONE TOOLS

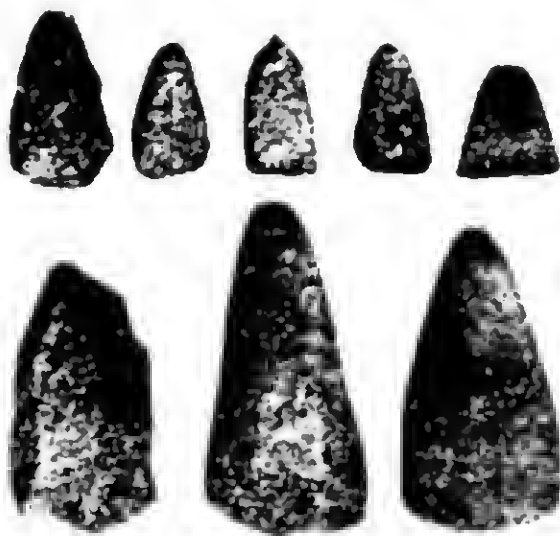


Fig. 49. NEOLITHIC STONE TOOLS

PLATE XLV



Fig. 50. MOHEN-JO-DARO SEALS WITH PICTOGRAPHIC SCRIPT



FIG. 51. DIADEMS EXCAVATED AT ADICHANALLUR



FIG. 52. VAKKALIGA COUPLE WITH PATTAMS ON THEIR FOREHEADS

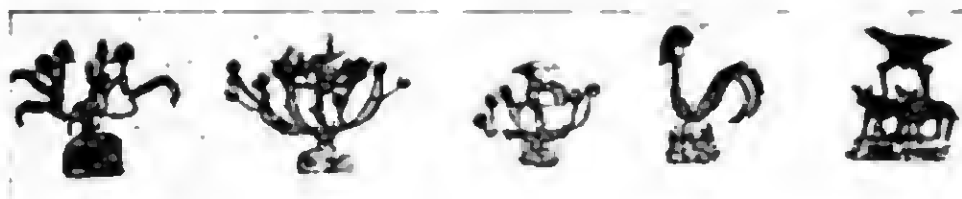


Fig. 53. BRONZE ARTICLES EXCAVATED AT ADICHANALLUR



Fig. 54. ADICHANALLUR —
FEMALE FIGURINE



Fig. 55. RAM SARCOFAGUS, FROM SANKAVARAM, CUDAPPAH Dt.



Fig. 56. EQUESTRIAN FIGURE
EXCAVATED FROM
CAIRNS AT NILGIRIS



Fig. 57. PROFILE VIEW OF
ROCK CUT CAVE AT
FEROKE: MALABAR



Fig. 58. BEADS EXCAVATED AT
ARIKAMEDU— AN INDO-ROMAN
TRADING STATION OF 1st CENTURY BC—AD

PLATE XLIX

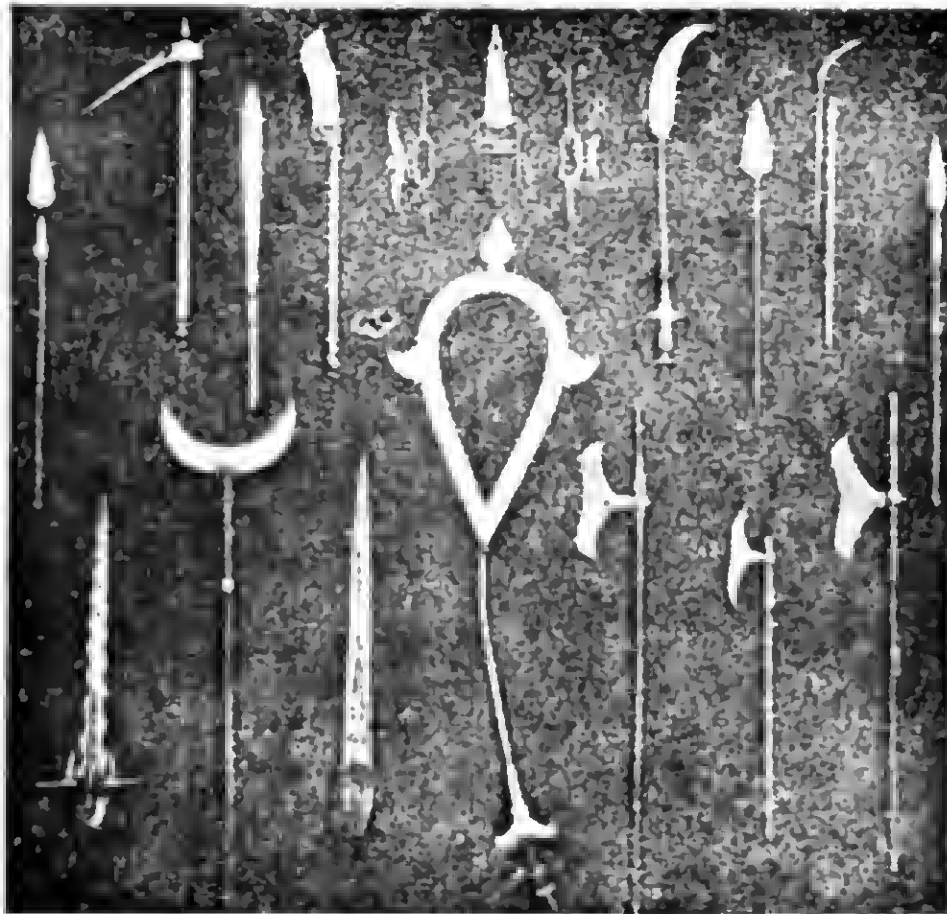


Fig. 59. ARMS COLLECTIONS GOT FROM
TANJORE ARMOURY

PLATE 1.



FIG. 61. KADAR WOMAN
(ANAMALAI HILLS)



FIG. 60. KADAR MAN
(ANAMALAI HILLS)



FIG 62. MALAVEDAN MAN : NOTE THE
CHIPPING OF CENTRAL INCISOR TEETH

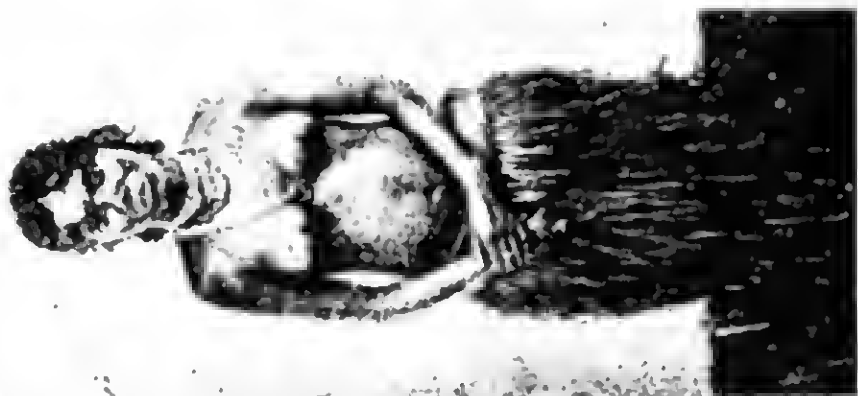


FIG. 63. THANDA PULAYA WOMAN
WITH SEDGE BARK DRESS



Fig. 64. TODA MANDS (HALF-BARREL HUTS)



Fig. 65. KOTA WOMAN WITH A TOURNETTE

PLATE LIII



Fig. 66. IRULA MAN CLIMBING STEEP ROCK FACE
WITH FIBRE LADDER FOR COLLECTING HONEY

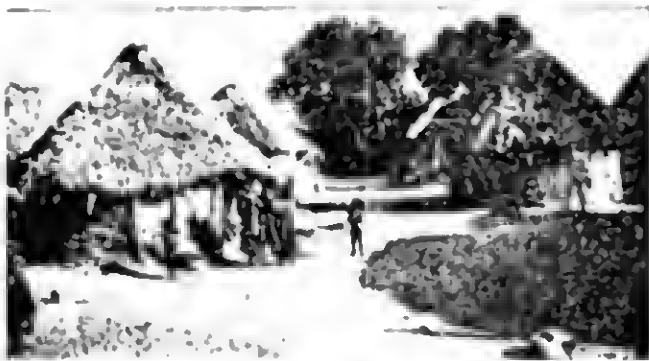


Fig. 67. CHENCHU (ANDHRA)
HABITATIONS



Fig. 68. CHENCHU ARCHER
FROM NALLAMALAI HILLS (ANDHRA)

PLATE LIV



Fig. 69.
LANBADI WOMEN



Fig. 70.
GADABA (GANJAM)
WOMEN
NOTE
THEIR DRESS AND
EAR RINGS



Fig. 71.
GADABA
PANCHAYAT
IN SESSION



Fig. 72.
MERIAH
SACRIFICE
POST FROM
BALIGUDA



Fig. 73.
KHOND DANCE



Fig. 74. SAORA WOMEN



Fig. 75. KOYA MAN DRINKING TODDY



FIG. 76. KOYA WOMAN WITH A FLOWER IN THE FAR

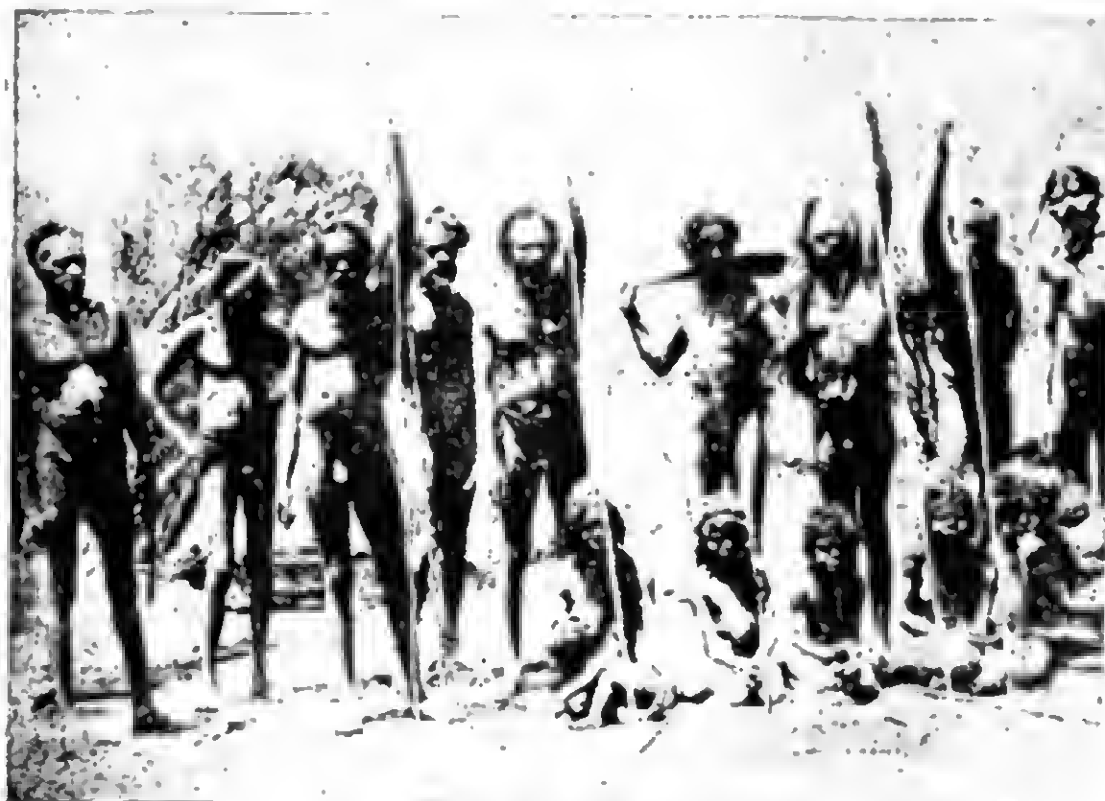


Fig 77. AUSTRALIAN ABORIGINES

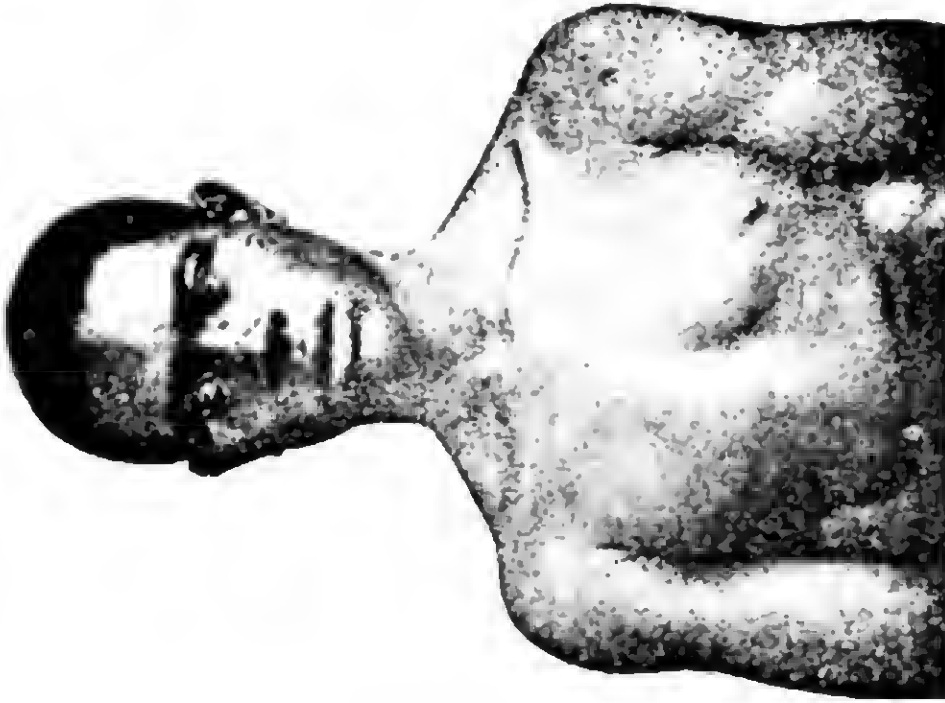


FIG. 79. AFRICAN NEGRO HALF BREED



FIG. 78. AMERICAN-INDIAN

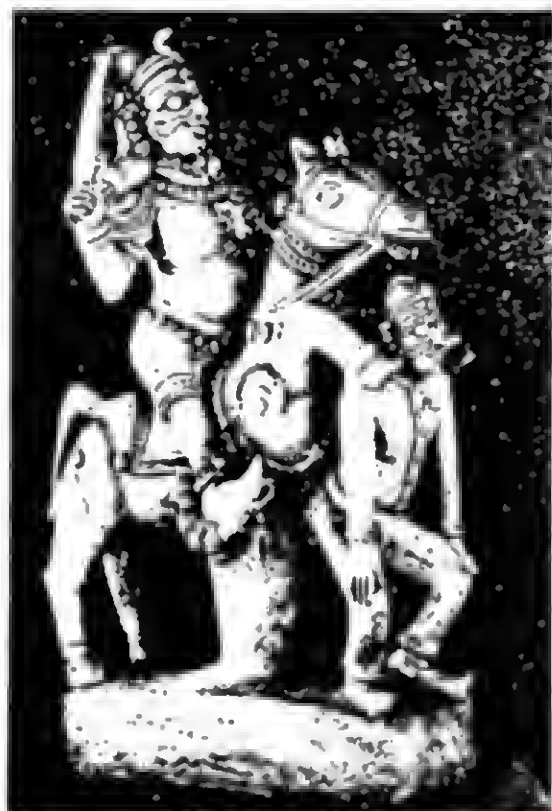


Fig. 80. MADURAI VEERAN (A VILLAGE GOD)



Fig. 81. YENADIS (ANDHRA) USING A FIRE DRILL FOR MAKING A FIRE

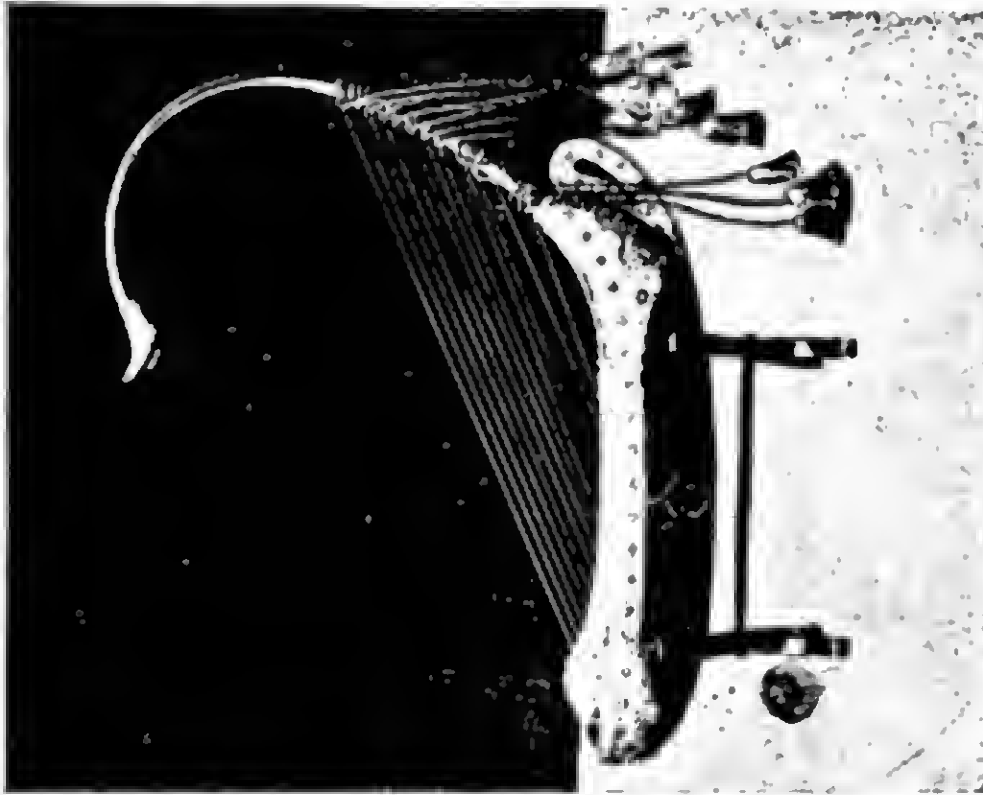


FIG. 83. BURMESE SAUN (HARP)



FIG. 82. PANIYANS OF KERALA USING A FIRE SAW
FOR MAKING FIRE



Fig. 84. PANCHA MUKHA VADYAM



Fig. 85. PULLUVA WOMEN PLAYING THE PULLUVAN KUDAM

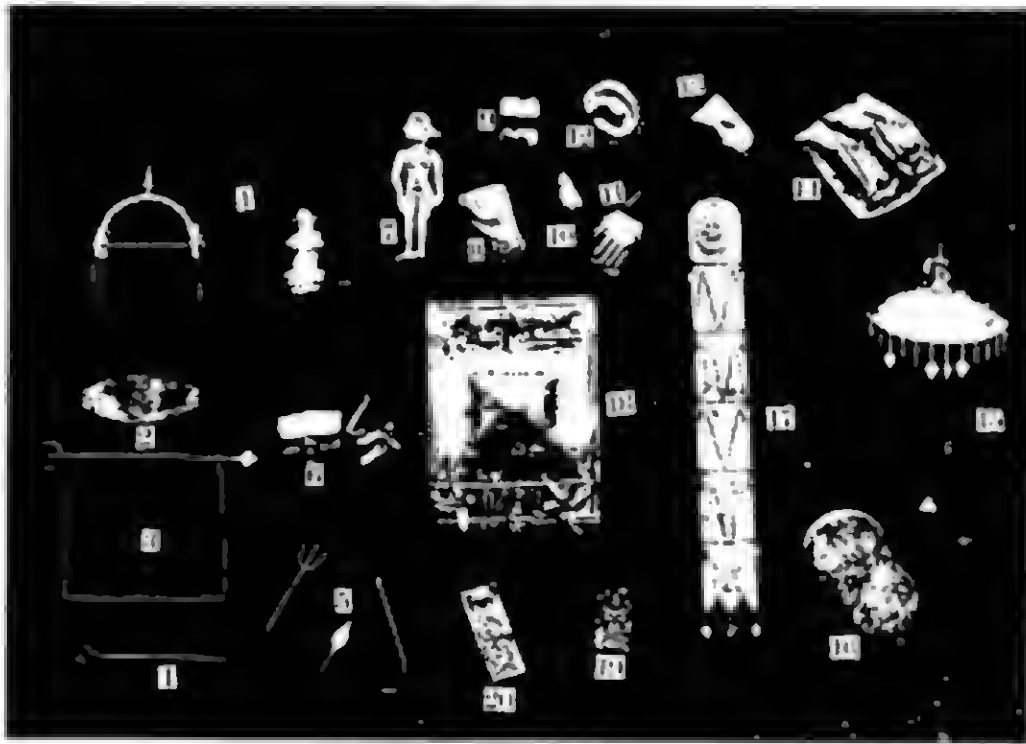


Fig. 86. VOTIVE OFFERINGS



Fig. 87. BHUTA FIGURES FROM SOUTH CANARA

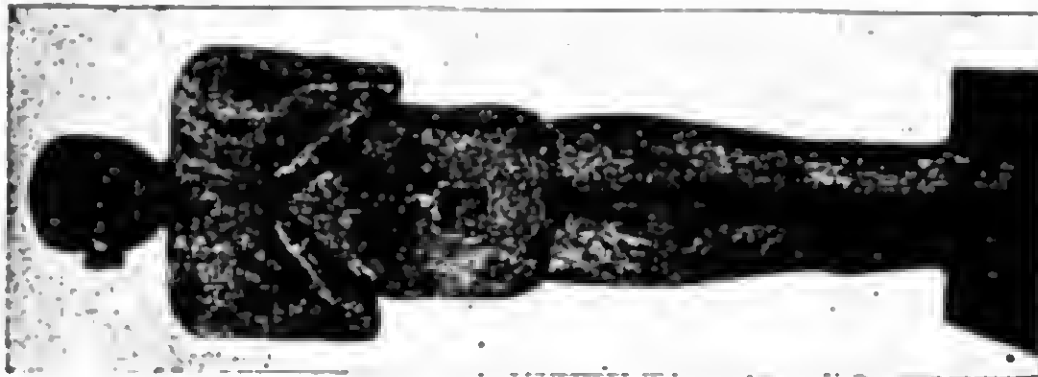


Fig. 88. MALABAR SORCERY FIGURE



Fig. 89. KATHAKALI FIGURES FROM KERALA
PACHAI : KATHI : STRI : THIADI



Fig. 90. ANDHRA
LEATHER SHADOW PLAY FIGURES

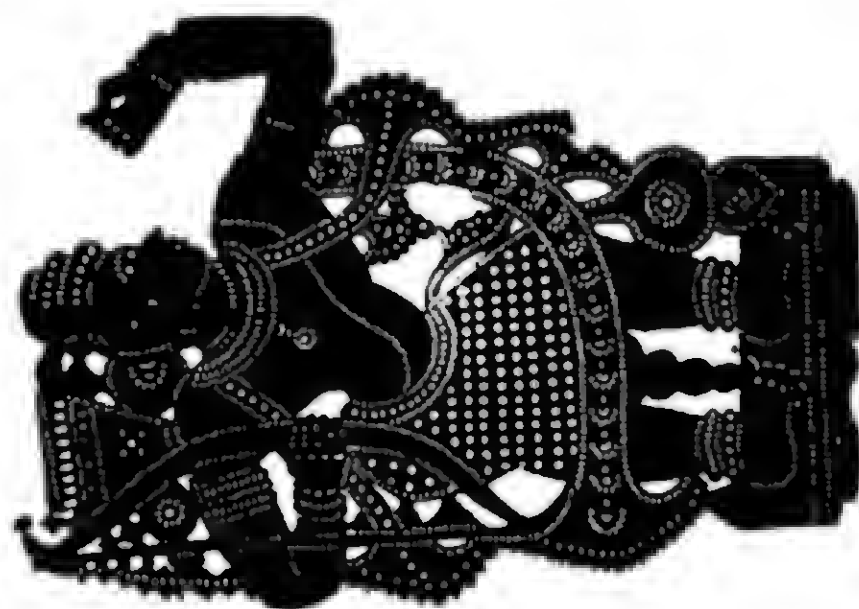
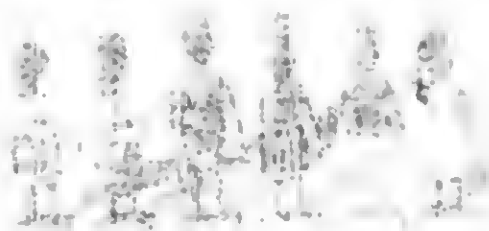
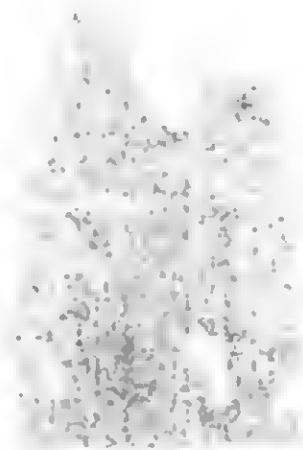
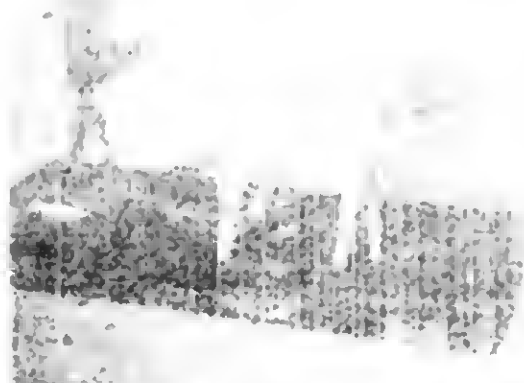


Fig. 91. MALABAR
LEATHER SHADOW PLAY FIGURES



ZOOLOGY

By

S. T. SATYAMURTI, M.A., D.Sc., F.Z.S.

(Superintendent, Government Museum, Madras)

The zoological galleries of the Madras Government Museum, as they stand today, are the tangible cumulative result of more than a hundred years of patient and determined effort on the part of a devoted staff, guided by the expert supervision of a succession of able directors whose powerful initiative and unflagging industry have contributed largely to the high standard of the vast array of material exhibited in these galleries. The past few decades have witnessed a record of steady improvement and expansion in all aspects of museum work relating to the zoological section. Apart from the skill, patience and laborious work involved in the collection, preservation, display, arrangement and interpretation of the exhibits in the public galleries, a great deal of effort had been concentrated on various other fields of museum activity, such as the building up of a substantial reserve collection for research and reference purposes, the organisation of planned collecting tours, faunistic surveys and systematic research work on various groups of animals collected by the Museum, the publication of the results of these researches in a valuable series of bulletins issued by the Museum and various kinds of educational services, particularly to schools all over the State.

The sprawling galleries of the zoological section in this Museum extend over eleven halls of varying sizes both on the ground floor and first floor of the southern wing of the main buildings, adjoining the sculpture galleries of the Archaeological Section. A leisurely ramble round these galleries is at once educative and entertaining giving the visitor a glimpse into the multifarious curiosities of nature's creations and exciting in him a keener and more lively interest in his environment of which animals constitute an integral part. A brief survey of these galleries, spotlighting the more spectacular and outstanding exhibits and some of the more notable recent additions will perhaps help the visitor better appreciating these marvels of Nature.

The largest and probably the most reputed and valuable among the exhibits in the zoological galleries is the gigantic skeleton of the Great Indian Fin Whale *Balaenoptera indica* (Fig. 93) suspended from the centre of the ceiling in the hall of general exhibits at the commencement of the zoological galleries. The whale from which this skeleton was prepared was a fair sized specimen, measuring over 60 feet in length and was washed ashore in Mangalore in 1874. This species inhabits the Bay of Bengal and the Arabian Sea and belongs to the great group of whales known as the Baleen Whales or Whalebone Whales which have no teeth but possess, remarkable, brush-like structures composed of numerous plates of baleen or whale bone suspended from the roof of the mouth on either side, enabling the whale to strain out the water from the fish, snails and shrimps on which these whales feed. They are thus 'filter feeders', being wonderfully adapted to this peculiar method of feeding. Fully grown specimens of this species attain a much larger size than the one exhibited here and are said to be the largest of animals known, living or extinct.

The other great group of whales, the toothed whales, which have solid teeth, instead of the Baleen plates, is represented in this gallery by the enormous skull and lower jaw of the Sperm Whale or Cachalot (*Physeter macrocephalus*). The head is enormous, about a third of the length of the body, as illustrated by a picture accompanying the skull, but this great square head is not occupied entirely by the skull; the cavity lying above, is filled with spermaceti, which is fluid fat, during the life of the animal and is of great commercial value.

Among other notable skeletal exhibits in the Museum, the huge skeletons of the Indian elephant and their skulls and tusks of solid ivory deserve special mention. There are two completely articulated and mounted skeletons of the Indian elephant, one in the centre of the mammal gallery and the other in the general skeletal gallery, and two enormous skulls with massive tusks weighing over 50 lb. besides a few sections of the skull which serve to illustrate the comparatively small size of the brain cavity in spite of the large size of the skull, and the presence of a large number of air spaces in the bones of the head which render the skull surprisingly light in proportion to its size. The entire mounted skeleton in the centre of the mammal gallery is that of a full grown tusker standing over ten feet in height at the shoulder, and arrests the attention of the visitor even from a great distance, by its imposing size. The other complete

skeleton in the general gallery is that of a female and is considerably smaller. The extreme shortening of the neck vertebrae, the enormous curved ribs enclosing the roomy thoracic cavity and the massive, pillar-like bones of the limbs are some of the noteworthy features in these skeletons. The tusks of the male elephant are the immense incisor teeth which keep growing continuously throughout life and it is these which perhaps render a dead elephant as valuable as a living one. The preparation of these impressive skeletons and their mounting and installation should have obviously involved tremendous labour on the part of the technicians who had set them up and deserve to be acclaimed as a triumph in osteological exhibition.

In the small hall adjoining the gallery of skeletal exhibits, there is an instructive section devoted to exhibits illustrating the phenomenon of flight in the various groups of back boned animals. Though the power of flight attains the climax of its development in birds, yet it is manifested in varying degrees also in the other well known groups of higher animals such as fishes, frogs, reptiles and mammals. On one side in this hall, the attention of the visitor is attracted by a group of flying fish *Exocoetus* sp. displayed as though they are leaping across the air over the surface of the sea. (Fig. 94). These are the familiar flying fish of the Madras Coast. In this remarkable species both the pectoral and pelvic fins are enlarged and flight is initiated by surface skimming movements, the propulsive power being provided by the side to side sweeping of the caudal (tail) fin, the lower lobe of which is longer than the upper. These fish may rise sufficiently high out of the water to be stranded on the decks of ocean going steamers.

Other selected examples of flying vertebrates, such as the flying frog, flying lizard and the large Indian fruit bat or 'flying fox' are also exhibited against the wall in this gallery, accompanied by enlarged X-ray photographs to show the skeletal adaptations to flight, and a large, well drawn picture of a curious extinct ancestral reptile known as the *Pterodactyl* which possessed a very well developed wing membrane and could fly almost as effectively as any bird. This series reaches its climax in a large specimen of the White-backed vulture dramatically displaying its full expanse of wings. It impresses on the visitor the remarkable mastery which the members of the feathered race have attained in the domain of flight by virtue of the unique adaptive modification of their forelimbs into the powerful flying organs familiarly

known as wings. Besides these, there are also a number of small, interesting exhibits displayed in wall cases in this gallery illustrating important biological phenomena such as mimicry, protective colouration and other types of adaptive colouration, notably among insects. They include the remarkable dead leaf butterfly, the stick insect and the leaf insect which attain, by reason of their structural peculiarities and colouration, an almost incredibly close protective resemblance to their surroundings. Other interesting specimens in this series are the beautiful swallow tail butterfly (*Papilio polymnestor*) in which the vital parts of the body are deliberately dull coloured so as to protect them from injury by predatory animals, and a pair of the common garden Lizard in the breeding season, showing the male with its throat red and distended—an instance where colour helps in courtship, serving to attract the mate.

Although the scope of our collections is limited to examples of South Indian fauna, this Museum can still boast of a small compliment of animals and birds from foreign countries which we have been fortunate enough to acquire. This collection has now grown so substantially that it has been found necessary to devote an entire gallery to foreign fauna, (Fig. 95). Among the exhibits in this gallery, the Orang Utan, a model of the bust of the Gorilla, the Tapir, the Kangaroo (*Macropus giganteus*) (Fig 96), the Duck-billed Platypus and the Cassowary are perhaps the most outstanding ones. A large male specimen of the remarkable Anthropoid ape, the Orang Utan, stares grimly at the visitor as he enters the rear half of this gallery. It is mounted grasping the branch of a tree as it habitually does and is accompanied by a mounted, articulated skeleton of a smaller specimen of the same animal. The Orang Utan lives in the dense forests of Borneo and Sumatra. The great length of its arms enables the animal to swing rapidly from branch to branch. This ape lives almost exclusively among the branches of trees and constructs a nest of leaves on a tree in which it sleeps at night. The Gorilla, (of which a model of the bust is exhibited in an adjacent case) is the largest, most powerful and awe-inspiring of the Anthropoid apes and inhabits the dense forest tracts of the Gaboon in the Congo basin in Central Africa. It is noted for its tremendous strength and ferocity.

The Malayan Tapir, of which a fine specimen is exhibited in this gallery, is another interesting foreign animal allied to the horse and the rhinoceros. Tapirs are found at the present day

in South and Central America and in the Malay Peninsula, Java and Sumatra, thus affording an excellent example of discontinuous distribution. They are nocturnal in habit and frequent the most secluded parts of the forest, feeding on vegetation. They take readily to water and can plunge and walk along the bottom of rivers, being capable of remaining under water for appreciably long periods. Young tapirs are beautifully spotted and streaked, but adults have only a plain, broad, white patch across the body. The specimen exhibited is said to have lived in the Madras Zoo before it was acquired and mounted at the Museum.

Australia, as is well known, has a peculiar fauna of its own most of its animals belonging to species found nowhere else in the world. The isolation of this island continent has been largely responsible for the evolution of unique species of animals. Examples of Australian fauna represented in our Foreign Animals gallery are the Cassowary, Kangaroo and the Duck-billed Platypus. The Cassowary ranks foremost amongst the small collection of foreign birds in the Madras Museum. It belongs to the group of heavily built, ostrich-like birds which have lost their power of flight, and is confined to the Australian Region where it inhabits densely wooded country, especially in the neighbourhood of creeks and streams. It is a shy bird, coming out of its shelter in the mornings and evenings in search of food. It feeds chiefly on fallen fruit in the jungle, but in captivity it is more or less omnivorous. It is a swift runner and can leap over considerably high obstacles. The eggs are very large and are incubated mainly by the male. The specimen exhibited in the Museum is said to have lived in the Madras Zoo for some time. Another important recent addition is a fine female specimen of the Ostrich—a native of Africa. It is a heavy flightless bird with strong legs. This specimen was a resident of the Madras Zoo before it was preserved and mounted at the Museum. A specimen of the Great Bustard (*Otis tarda*) which is a native of Europe and Africa, is also exhibited in this gallery.

The Kangaroo and the Duck-billed Platypus exhibited in this gallery are comparatively recent additions to our collection of foreign animals. The skin of a large male Kangaroo was very kindly presented to the Museum by Dr. Herbert Hale, Director of the South Australian Museum, Adelaide, in exchange for a small series of skins and skulls of the Indian Pariah dog which he needed for purposes of comparative study. It is this skin of

the Kangaroo that has been stuffed, mounted and exhibited in a characteristic pose in this gallery. The Kangaroo is a herbivorous marsupial, confined to the Australian region, and as is well known, the female bears a pouch in which the newly born young are carried about for a considerable period. Their forelimbs are relatively weak and are used mainly in feeding, but the powerful hind limbs and thigh muscles enable them to progress with remarkable swiftness by long leaps and bounds. They feed mainly on fruits and vegetables.

The specimen of the Duck billed Platypus (*Ornithorhynchus*) exhibited close by, is a gift from Mr. Prescott, the Director of the National Museum, Melbourne. This curious animal, confined to Australia, is one the most primitive of living mammals, laying eggs and well adapted for an aquatic habitat. The Australian spiny Ant-eater (*Echidna*) which is also a primitive egg-laying mammal allied to the Platypus, is exhibited in the general gallery of comparative exhibits along with specimens illustrating variations in the integumentary structures of mammals.

A collection of beautiful birds, illustrating bright plumage exhibited provisionally in the ground floor of the new extension to the Natural History gallery makes a particularly impressive display by virtue of the gorgeous colour and lustre of their feathers. These include mostly foreign birds, but a few are found far north in the Himalayas and some are migratory visiting India only in winter. This series includes the beautiful Macaw from tropical South America,—a magnificent multi-coloured parrot, the exquisite little Mandarin Duck from China (Fig. 97) (*Aix galericulata*), the Silver Kaleeg Pheasant with its graceful ornamental plumage, also from China, a male Tragopan from the Himalayas with a brilliant ocellated plumage and a male Brahminy Duck, or Ruddy Sheldrake—a brightly coloured migratory duck found in summer in Europe and Northern Africa but migrating down to the plains of India, Burma, South China and Japan in winter. The Tragopan (Fig. 98) (*Tragopus blythi blythi*) and the Brahminy Duck are recent additions to our collections received from the Madras Zoo. All these birds with their richly coloured plumage serve to demonstrate impressively how lavish mother Nature can afford to be in clothing her children.

But apart from the few exhibits of foreign animals we have just surveyed, the bulk of the Museum's collections, both in the galleries and in reserve storage, consist of specimens of

indigenous animals and a student or a layman gets a fairly complete picture of South Indian fauna by making a study tour round the galleries. It may be of interest to refer now to some of the more notable ones among these exhibits, particularly those which have been added in recent years. Among reptiles the visitor will be particularly impressed by a huge specimen of the luth or the leathery turtle (*Dermochelys coriacea*) (Fig. 99) exhibited in the Reptile gallery in the spacious case containing several other specimens of Indian marine turtles. It is the largest of living turtles, reaching a length of seven to eight feet and is sometimes known as the trunk-back owing to the presence of strong, longitudinal ridges on the back. It is remarkable in that it is the only species of turtle in which the vertebral column is free from the dorsal shield. It feeds on fishes, molluscs and crustaceans and comes ashore to lay its eggs. Its large, strongly flattened, paddle-shaped limbs serve as excellent swimming organs. A tortoise from Seychelles (*Testudo emys*) (Fig. 100) is one of the important exhibits in the Reptile gallery. This is a black tortoise exhibited in a standing posture in a centre case.

A good representative series of specimens of the Indian species of crocodiles of varying sizes, ranging from very young ones barely a foot long, to giant specimens measuring from about eight to ten feet in length, also make an impressive display among the exhibited reptiles in this gallery. Among these, a moderately young, half grown specimen of the Mugger or Marsh Crocodile (*Crocodylus palustris*) (Fig. 101) about three feet in length, which had been recently acquired from the Madras Fisheries Department is mounted with its jaws gaping open and the teeth exposed, and its colour being fresh, looks more realistic and life-like than the others in this series.

Among snakes, a stuffed specimen of the Indian Python or Rock Snake, which was acquired recently from the Trichur Zoo, and attracted large crowds when it was put up as a live exhibit at the entrance to the Museum for some days prior to its ultimate preservation, is one of the most remarkable specimens exhibited in this gallery. It is the largest of Indian snakes and is capable of capturing and swallowing animals much bigger than itself, by means of its powerful and widely distensible jaws. The specimen exhibited cast its skin in pieces exposing the brilliant sheen and gorgeous colour of the fresh skin underneath and greedily captured and swallowed a couple of live hens which were offered

to it during the brief period of its existence in the cage at the Museum before it was finally killed and preserved.

Another interesting exhibit is a stuffed specimen of the Blood-sucker (*Calotes versicolor*) shown in its natural habitat. (Fig. 102).

A large number of South Indian species of snakes are exhibited in this gallery arranged in systematic series. The exhibited snakes comprise both poisonous and non-poisonous forms and include real specimens mounted in jars of alcohol as well as plaster and wax casts painted in natural colours. The well known poisonous snakes of India, namely, the Cobra, Krait, Russell's Viper and Sea snakes are represented by fine specimens. Among the most remarkable of the reptilian specimens added to our collection in recent years are the Banded Krait and the Rattle snake—both highly poisonous. They were received from the Madras Zoo, soon after the Zoo Centenary Celebrations. The specimen of the Banded Krait is a particularly large and attractive one, alternately banded with bright yellow and black transverse bands but as the brilliant colour is apt to fade rapidly in spirit, a wax cast, painted in natural colours, was prepared and put up along with the wax casts of other snakes in this gallery. The Banded Krait (*Bungarus fasciatus*) (Fig. 103) enjoys a wide range of distribution, but in the Indian Peninsula it is confined to the north east, although it has been recorded from as far south as Hyderabad. The present specimen is said to have come from West Bengal. Although its venom is extremely virulent, it is quiet and inoffensive in its disposition.

The Diamond-backed Rattle snake is another valuable addition to this gallery. It is an American species of viper, belonging to the group known as the Pit-vipers, characterized by the presence of a well marked pit, the loreal pit, between the eye and the nostril. Rattle snakes are confined to the New World but forms allied to them (and, of course without the rattle) are represented in the hills of southern India. The Rattle snake preys chiefly upon small animals hunting for them at night. The rattle which is found at the end of the tail, is composed of a series of horny bells, which fit into each other. The rattle is useful to the snake as a means of warning off any approaching enemy. The noise of the rattle is very loud in dry weather, much duller on wet days, and is a shrill sound like that of a rattling alarm clock which is sometimes deafening.

The small section devoted to frogs and toads at the further end of this gallery contains a display of specimens representing the various species of South Indian amphibians, including an interesting habitat group of the common chumna frog which lays its eggs in a frothy mass on leaves of plants overhanging water, so as to enable the young tadpoles, when they hatch out, to gain ready access to water in which element alone they can proceed with their further development into the adult state. A huge bull frog mounted in a jar also arrests the attention of the visitor in this section: it is the largest of Indian frogs, attaining a length of more than six inches. A few peculiar snake-like creatures known as blind worms or Coecilians exhibited in this section are of special interest as they are more nearly related to frogs and toads than to snakes, despite their superficial resemblance to the latter.

In the large and spacious gallery of birds, adjoining the gallery of reptiles, the visitor is presented with a display of an almost complete series of South Indian birds arranged systematically in their natural sequence - a collection that had been gradually built up through several years of patient and arduous labour, and stands today as a veritable text book of South Indian Systematic Ornithology. The Peacock, with its gorgeous display of its outstretched, ocellated feathers, the Pied crested Cuckoo (*Clamator jacobinus*) (Fig. 104) with its beautiful chestnut plumage, the flamingoes, with their long, stilt-like legs displayed as though wading through a salt marsh, the night herons (*Nycticorax griseus*) (Fig. 106) nesting and feeding their young and other fine habitat groups of birds such as the weaver bird with its long flask-shaped pendant nests, the white-breasted water-hen shown skulking among reeds at the edge of a marsh, the white-breasted kingfisher with its eggs laid in a hole on a river bank, which beautifully illustrate their respective nesting habits, lend colour and charm to the display of this extensive array of feathered creatures. The Hornbill, (*Dichoceros bicornis*) (Fig. 105), a large, heavily built bird with an enormous, unwieldy beak, found in the forests of Western Ghats and exhibited independently in a case adjoining the one containing the kingfishers and hoopoes, will particularly attract the attention of visitors in this gallery. It nests in a hollow which it excavates in the trunk of a tree, and throughout the entire period of incubation, the female is virtually imprisoned in this hollow by a wall which she builds for herself with her own droppings, using her bill as a trowel leaving only a narrow

slit in the centre through which the male assiduously feeds her during this period of self imposed confinement.

One of the most unique and valuable of our recent zoological acquisitions were a pair of the Pink-headed Duck (*Rhodonessa caryophyllacea*) exhibited in this gallery among the collection of ducks. This is perhaps the rarest and one of the strangest ducks in the world. Its habitat is among the small plains lakes of the remotest hinterland of Bengal, north of the Ganges and west of the Brahmaputra. For the past fifty years there has been no record of this unique species and it almost appears as if this beautiful duck has become extinct now. As a rule it collects in small parties and breeds in dense forests and jungles, making a nest of grass and weeds in tangled undergrowth near the edge of remote forest pools and swamps. Of all our Indian Ducks, this is said to be the most shy, wary and secretive. Half a century ago this Duck was reported to be common, but at the present day, it is extremely rare, and few men know where the last of this vanishing species is to be found. The present specimens were mounted from a pair of skins purchased from the late Mr. Inglis' collection, and are reported to have been collected from a jheel in the Darbhanga District of North Bihar.

Another notable recent addition to the bird gallery is a fine male specimen of the elegant Mute Swan which was received from the Madras Zoo. This is the only swan that visits India in any appreciable numbers in winter. It may be distinguished from all others by the black knob at the base of the bill, and by the bare black patch which extends from the bill to the eye. Its true home is in Central and South Eastern Europe and Western and Central Asia. In winter it visits North Africa and comes as far east as North Western India, where it has been recorded from the Peshawar and Hazara Districts. They occur singly or in small flocks, feeding on water weeds, grass and fish spawn. This Swan is aptly called the Mute Swan, as it is far more silent than the other species, though not actually voiceless.

A pair of the Grey Jungle fowl (*Gallus sonnerati*) (Fig. 107) (male and female) collected recently from the scrub jungles around Pudukkottai and mounted and displayed in a natural setting is another exhibit of special interest, as this species is said to be the ancestor of our domestic breeds of poultry. The cock has an attractive plumage. The Grey Jungle fowl inhabits scrub jungles especially in areas where bamboos grow. Its

distribution extends from Central India through South India to Cape Comorin. It is extremely alert and runs to cover on the slightest suspicion of approaching danger. It feeds on berries and grains and sometimes also on termites.

At present, many of the exhibits of birds have been shifted provisionally to the new Natural History Block, pending the completion of the reorganization and modernization of the Bird gallery.

Apart from the birds themselves the Madras Museum possesses a rich collection of birds' eggs. Collection of birds eggs and their correct identification are not easy tasks and the Madras Museum may justly be proud of this unique scientific treasure. Recently, we were fortunate in having managed to acquire over 500 specimens of named birds' eggs from localities ranging all over the world, belonging to the late Mr. Inglis' collections. Some of them are from distant places such as Japan, Russia, Scotland and other parts of Europe and many of them are remarkable for the beauty of their colour and colour patterns. The greater part of our egg collection is stored up in the reserve cupboards, far want of display space, but a few selected examples are exhibited in a separate series to illustrate the significance of the evolution of colour markings in birds' eggs. Eggs of birds vary a great deal in their size and colour, but it is interesting to observe that the brightly coloured birds do not, as a rule, lay brightly coloured eggs. As a matter of fact, the reverse is, to some extent, true, and many birds of bright plumage as, for instance, the Woodpecker and the Indian Roller, nest in holes and lay white eggs. This may be due either to the fact that white eggs are more easily seen in dark holes, or, having been laid in these conditions through successive generations, they have not evolved protective colouration. As expected, among the protectively coloured eggs, the most noticeable are those laid on bare ground, e.g., sandgrouses, plovers and lapwings. The eggs of these birds are mottled and blotched so as to harmonise perfectly with their surroundings.

In the centre of the adjoining gallery, which is devoted to the display of selected examples of South Indian mammals, stands the huge and predominating skeleton of a male Indian elephant displaying its tusks in their full splendour. Among our collection of South Indian mammals, which has recently been enriched by the addition of two fine specimens of the Indian

Sloth Bear (*Melursus ursinus*) (Fig. 108), one standing erect on its hind quarters and another mounted standing on all fours on an artificial rock-like pedestal and the Indian Wild Boar, (*Sus cristatus*) (Fig. 109) mounted in a life-like pose on an artificial rock-like base, visitors will be specially interested in the large ferocious carnivores such as the Leopard, the Tiger (*Felis tigris*) (Fig. 110) and the Hyaena, members of the deer tribe such as the Antelope or Black Buck, the Spotted Deer and the Barking Deer and in the remarkably fish-like aquatic mammals, the Dolphin and the Dugong. One of the notable additions to this gallery is an attractively mounted specimen of the Cat-Bear or Indian Panda, (*Ailurus fulgens*) (Fig. 111). Its bright chestnut colouring and ringed tail are its most distinguishing characteristics. This mammal which is about two feet in length inhabits the temperate forests of the Himalayas. A stuffed specimen of Chinkara or the Indian gazelle (*Gazella bennetti*) (Fig. 113) has been added recently. This gazelle is of a slender, graceful build and inhabits the plains and low hills of North Western and Central India and south upto the Krishna river. The Elliot's Dolphin or Porpoise is common in the Bay of Bengal and may be seen leaping in "schools" over the waves occasionally near the sea-coast. Unlike the usual condition in mammals their teeth are conical, regular and set in a uniform series and are eminently fitted for catching the slippery fish on which they principally feed. The dugong or sea-cow (*Halicorn dugong*) (Fig. 112), belongs to a totally different order of mammals despite its superficial resemblance to the dolphin, and is an inhabitant of coastal waters browsing on sea weeds. Its familiar habit of holding its young against its mammae between the flippers has probably originated the myth of the mermaid. It is valued commercially for its oil which is an excellent lubricant for delicate machinery.

A few other peculiar species of local mammals displayed in this gallery also deserve special mention. These are the Scaly Ant-eater, with its strange, pointed snout, toothless mouth long, tubular tongue and an invincible armour of plate-like scales, the little Slender Lorís (Tam. *thavangu*), with its large eyes and round, owl-like countenance and slender limbs, the Porcupine with its powerful defensive and offensive armour of sharp, spear-like quills and the large Indian Fruit Bat or Flying Fox, displayed hanging in a group by their claws from the branches of a tree. The Bat is the only mammal that is capable of sustained flight

but others such as the Flying Squirrel which may be seen exhibited in another case, nesting in the hollow of a tree trunk, can glide for considerable distances through the air by means of a flap of skin extending between the front and hind limbs at the sides of its body. Finally, the group of monkeys, langurs, and the gibbon (Figs. 114 and 115) with their lean, ludicrous faces and long, rope-like tails afford an interesting climax to the display of mammals in this gallery aptly serving to remind the visitor that he himself represents, after all, only a slight advance over these humble creatures anatomically.

The spacious hall on the first floor, directly above the Mammal gallery, is devoted to a display of Indian fishes in almost endless variety. As the visitor enters this hall from the Invertebrate Gallery, perhaps the first exhibit that strikes his eye is the enormous specimen of the Whale Shark (*Rhineodon typicus*), suspended from the ceiling. The Whale Shark is the largest of existing fishes and is known to attain a length of over fifty feet. The specimen exhibited here is twenty two feet long and was captured in Madras in 1889. The species has been recorded on several occasions both on the East and the West Coast of India, but the home of the Whale Sharks is among the East Indian Archipelagoes, and they migrate periodically to the Indian coastal waters, their migratory movements depending largely upon the abundance of planktonic organisms on which they mainly feed. The Whale Shark is beautifully ornamented all over with round, white spots on a deep purplish grey ground colour, and the specimen in the Museum has had to be renovated and repainted on several occasions in order that it might retain in some measure its original beauty of form and colour. Other piscine denizens of the Indian waters, such as the Rayner's Shark the Saw fish with its snout elongated into a formidable double-edged saw to serve as a weapon of offence, the man eating tiger sharks which are a menace to sea bathers on the Madras Coast, the huge Sting Rays, with their powerful, stinging, whip-like tails and the Swordfish with its snout prolonged into a sharply pointed 'sword' and a broad sail-like dorsal fin spreading over its back and sometimes serving literally as a sail, are also exhibited in this hall of South Indian fishes, impressing the visitor by the imposing grandeur of their unusual size and structural peculiarities.

Besides the numerous outstanding exhibits of vertebrate animals outlined above, this Museum possesses a wealth of material comprising the lowly organised invertebrate animals

which reveal the vivid beauty of Nature's humbler and less well known creations, particularly the manifold curiosities of marine life, and impress upon the visitor her superb skill and ingenuity as a supreme artist. The collection of corals, for instance, exhibited in the front hall of the Invertebrate gallery on the first floor, includes a wide range of variety in form and structure and contains several fine specimens of various species aptly known as the brain coral (*Coelaria arabica*) (Fig. 116), the mushroom coral (*Fungia echinata*) (Fig. 117), the stag horn coral, the cup coral, the tree coral and the fan coral in allusion to their particular shape and appearance. Coral looks like a stone, and appears to grow like a plant, and yet it is of animal origin. Corals are the hard, limy, skeletal structures of lowly organised marine animals, mostly colonial, allied to the sea anemones and jelly fishes, and reach their maximum exuberance of growth in the tropical seas in moderately shallow water. Their continued and extensive growth results ultimately in the formation of coral reefs and islands, which in their turn accommodate a thriving population of various other types of marine organisms. The bulk of the corals exhibited in this gallery have been collected from the coral reefs at Pamban, near Rameswaram, and the tremendous effort and labour involved in collecting, preserving, transporting and displaying these exquisite pieces of Nature's own art in the Museum, will be readily appreciated.

The Museum is also considerably rich in its collection of shells—another large group, mostly marine, displaying an almost endless variety in shape, colour and structure. Among these, the ponderous shell of the giant clam (*Tridacna cumingi*), collected from the Laccadives, is one of the most impressive exhibits. (Figs. 118 and 119). It is the largest among the shell-bearing animals now living, and is noted for the enormous muscular strength of the living animal, which might even close in its two massive shell valves on the legs of an unwary diver with such tenacious strength as to result in the victim being subjected to a fatal amputation. Pearl oyster shells showing the actual formation of pearls from the mother of pearl layer in the shell, the Helmet shell (*Cassis madagascariensis*) (Fig. 120.) showing cameo-carving and the sinistral shell of the sacred chank with its unique, left-handed aperture which is greatly venerated in India in view of its extreme rarity also figure foremost among the more valuable specimens of the Museum's collection of shells. Further, an enormous number of rare and beautiful specimens of shells collected from various localities all over the world by the

late Mr. M. D. Crichton—a keen conchologist—and donated to this Museum, has considerably enriched our shell collections in recent years but a great part of this has had to be kept in reserve storage, for want of exhibition space in the galleries. Recently, a collection of about thirty seven specimens of Japanese shells, obtained by exchange has been added to the shell gallery.

Other notable exhibits in this gallery are the remarkable starfishes, sea urchins and sea lilies which display a characteristic pentaradiate symmetry, a large series of insects representing the various important orders of insects, brightly coloured specimens of crabs and lobsters including the enormous coconut crab common on the Andamans and Nicobar Islands, and an interesting collection of Arachnids, which, besides the scorpions and spiders, includes a fine specimen of the unique King Crab (*Limulus*) (Figs. 121 and 122) which, with its heavy armour and grotesque appearance, is often described as a living fossil as it has stagnated in evolution and practically remained unchanged throughout the long period of its fossil history which dates back to the Triassic period, which is about two hundred million years old.

At the present day, in almost every advanced country, all the world over, Museums have come to acquire a new significance in the scheme of life. From their rather unenviable status of being mere show places or repositories for a miscellaneous assemblage of objects, some years ago, they are now gradually coming to the forefront and beginning to assume a more dynamic function, particularly as an indispensable instrument in the field of education, both of children and of adults. The Museum of the present day should therefore move with the times and be prepared to shoulder many fresh responsibilities if it has to fulfil the growing demand on its resources as an educational institution. In order to achieve this, the primary need is to modernize our Museums, particularly in the methods of presenting and interpreting our material to the public so that they may be viewed and appreciated to the best advantage.

It is with this end in view that we have in recent years, begun to introduce a few new features in the zoological galleries, which aim at improving the organisation and display of the exhibited material. One of these is to render the display of natural history specimens as pleasing and attractive as possible by exhibiting them in the form of small, illuminated dioramas, with painted backgrounds and artificially modelled accessories

such as grass, vegetation, rockwork, etc., in the foreground. The best known Indian poisonous snakes, namely the Cobra, *Naja naja*, (Fig. 123) and the Russell's Viper and the beautiful Starred Tortoise of South India, *Testudo elegans*, (Fig. 124) have been displayed in such dioramic cases, although there are several other habitat groups in this Museum which may be conveniently converted into this more attractive dioramic method of display. Another recently prepared diorama represents, on a small scale, the typical appearance of a coral reef exposed at low tide, with its characteristic associated fauna including snails, crabs, starfishes and sea urchins with the background painting depicting the sea. These dioramas, although built on a small scale rank among the most attractive exhibits in the Museum on account of their colour and realistic appearance. We have been able to make only a beginning in this direction, but it is hoped that very soon we shall be able to build more of these attractive cases when more funds and trained technical personnel on the staff are available.

Another improvement that has recently been effected is to render the display of the exhibits as pleasing and attractive as possible, by providing them with suitable backgrounds and introducing a distinctive colour scheme in each gallery, particularly for the interiors of show cases so as to relieve the monotony of an otherwise drab series of specimens and to make the visitor feel a pleasant change of atmosphere as he passes from one gallery to the other. It has been proved that such an effect tends to reduce museum fatigue to a considerable extent. Electrification of all the galleries has also been effected during recent years as a primary step towards modernization, as no museum attempting to modernize its galleries can afford to remain without artificial illumination. Now that shadowless fluorescent lighting is available at a comparatively low cost it is hoped that ultimately it would be possible to install interior illumination for the individual show cases especially in the Reptile and Bird galleries (Figs. 125 and 126.) Another attempt to lend added charm to the galleries was made recently by the introduction of a scheme for putting up murals in the galleries so as to enhance their attractiveness. As an experimental measure a large mural showing a flock of White Ibis gracefully flying in formation was first made and put up in the Bird gallery and this has proved to be so highly satisfying that another mural of equal size depicting Wood Ibises, Snake birds and Egrets in their natural haunts was prepared and added to this gallery so as to balance the original one. Preparation of enlarged models of small and inconspicuous

subjects such as the house fly and the mosquito is also another filled of activity in which we are attempting to progress, as some of these objects, in their original form are difficult to exhibit by reason of their small size and obscurity. Besides the exhibited specimens, the Zoological section possesses a large reserve collection consisting of over a thousand specimens stored in jars and several hundreds of dry preserved specimens preserved in boxes and cabinets. These are always available for study and research by students and scholars.

It is hoped that in the years to come it would be possible for us not only to maintain in trim condition the rich heritage that has been handed down to us in the invaluable collections of the Museum but also to continue the improvements and developments that have been taken on hand recently and hand the collections down to posterity in a refined, augmented and modernised setting as a legacy truly worthy of the traditions of this great institution.

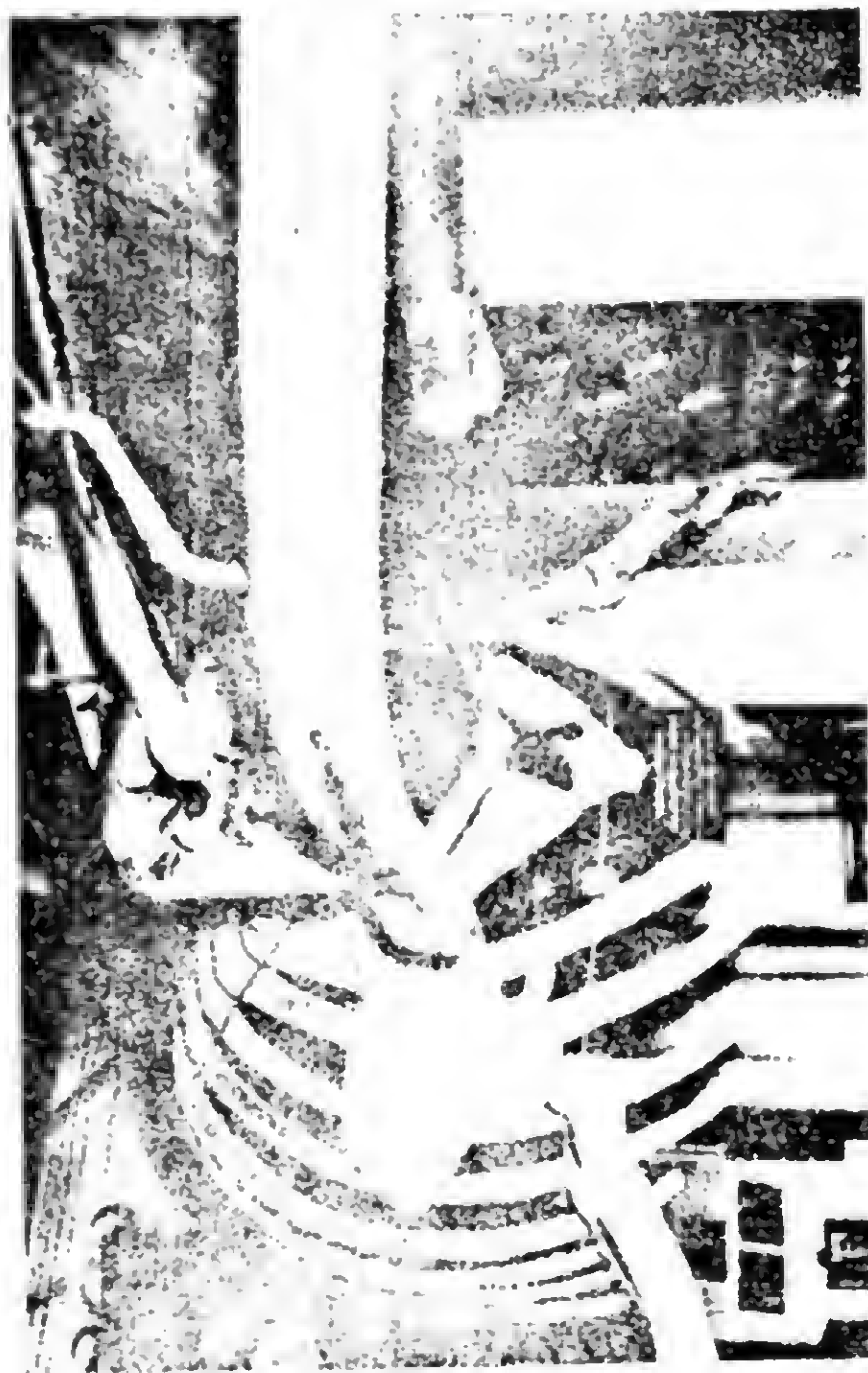


FIG. 91. THE GREAT INDIAN WHALE : BALÆNOPTERA INDICA



Fig. 94. A GROUP OF FLYING FISH : EXOCOETUS POECHLOPTERUS

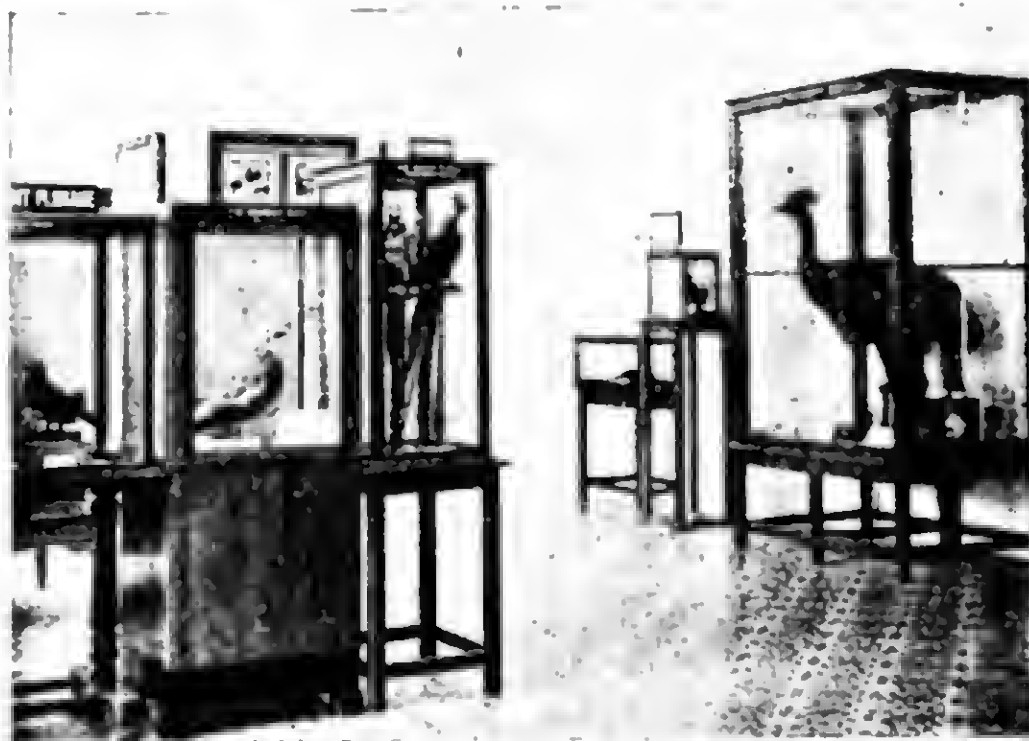


Fig. 95. FOREIGN ANIMALS GALLERY



Fig. 96. THE KANGAROO : *MACROPUS GIGANTEUS*



Fig. 97. THE MANDARIN DUCK : *AIX GALERICULATA*



Fig. 98. THE TRAGOPAN : *TRAGOPAN BLYTHI BLYTHI*



Fig. 99. THE LEATHERY TURTLE : *DERMOCHELYS CORIAEA*

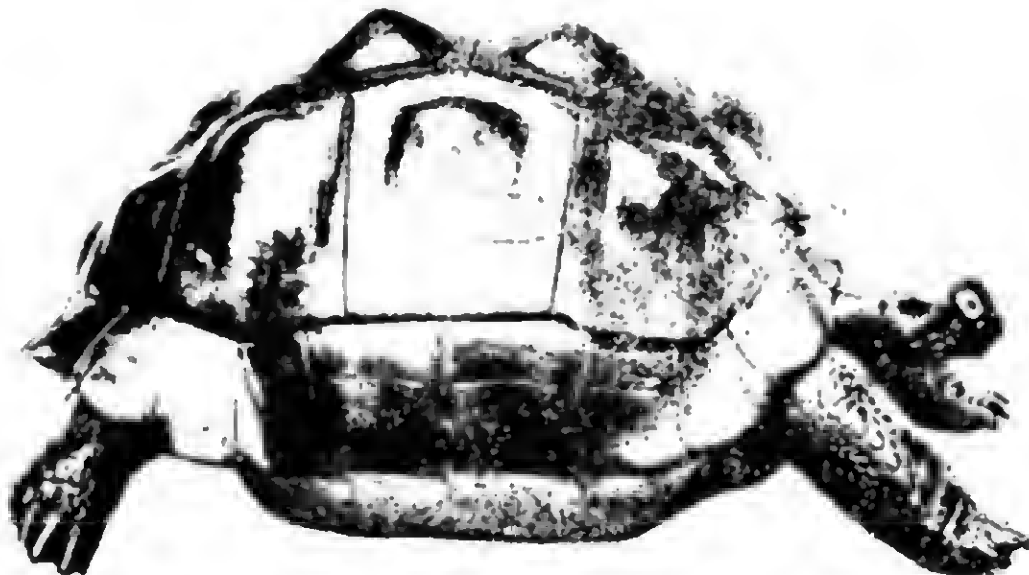


Fig. 100. LAND TORTOISE FROM SEYCHELLES : *TESTUDO EMYS*



Fig. 101. THE MUGGER OR MARSH CROCODILE
(YOUNG) : *CROCODILUS PALUSTRIS*



Fig. 102. THE BLOOD SUCKER : *CALOTES VERSICOLOR*



FIG. 103. THE BANDED KRAIT : *BANGARUS FASCIATUS*



Fig. 104. THE PIED CRESTED CUCKOO: CLAMATOR JACOBINUS



Fig. 105. THE HORNBILL: DICHOCEROS BICORNIS



Fig. 106. THE DIORAMA OF NIGHT HERON : NYCTICORAX
GRISEUS



Fig. 107. THE JUNGLE FOWL : *CALLUS SONNERATI*



Fig. 108. THE INDIAN SLOTH BEAR : *URSUS URSINUS*

PLATE LXXVI

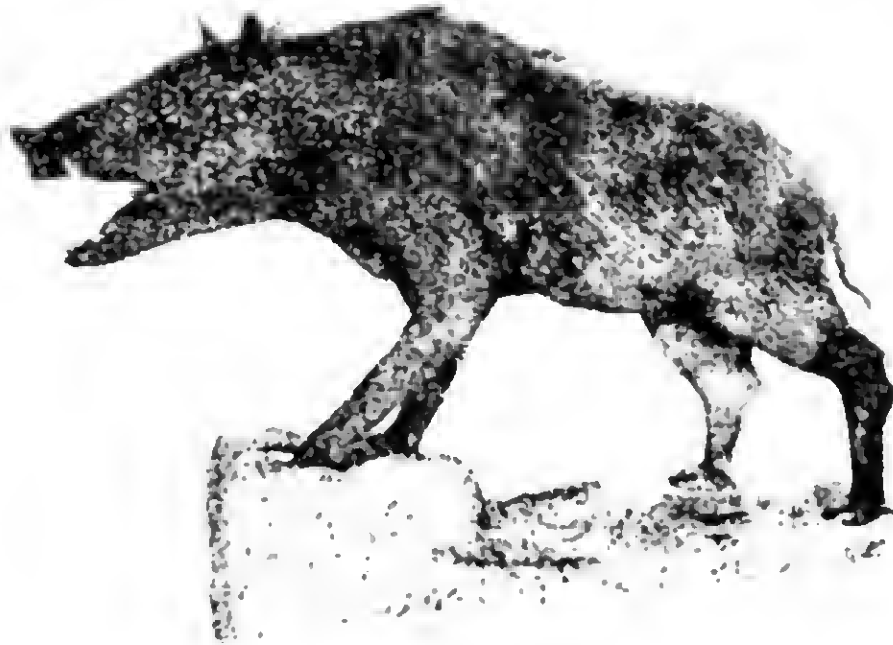


Fig. 109. THE INDIAN WILD BOAR *SUS CRISTATUS*



Fig 110. THE TIGER : *FELIS TIGRIS*



Fig. 111. THE CAT-BEAR OR INDIAN PANDA : *AILURUS FULGENS*



Fig. 112. THE DUGONG OR SEA COW : *HALICORNE DUGONG*



Fig. 113. THE INDIAN GAZELLE OR CHINKARA : *GAZELLA BENNETTI*

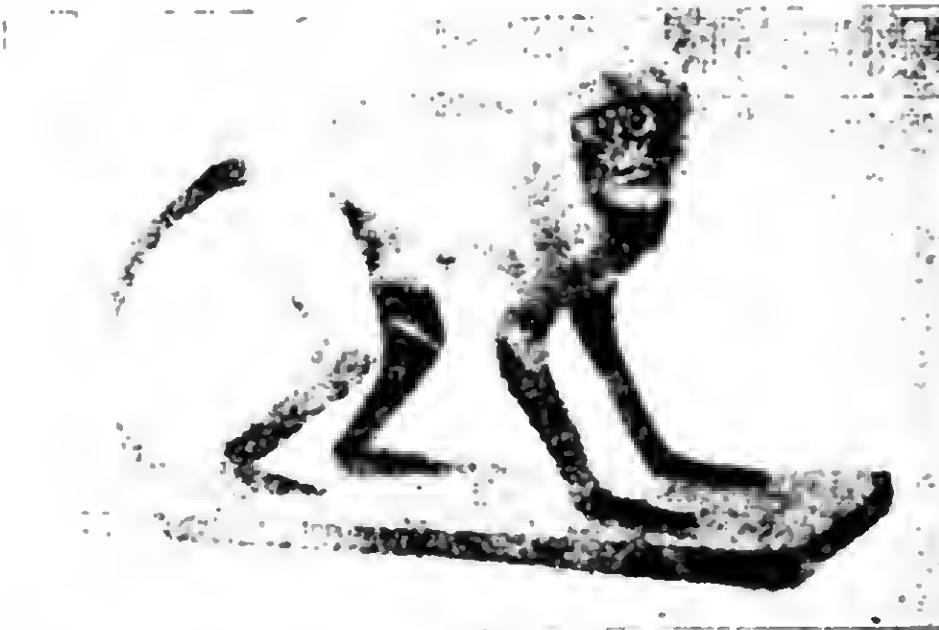


FIG. 114. MALABAR LANGUR : SEMNOPITHECUS ENTELLUS



FIG. 115. THE WHITE-BROWED GIBBON : HYLOBATES HOOLOCK

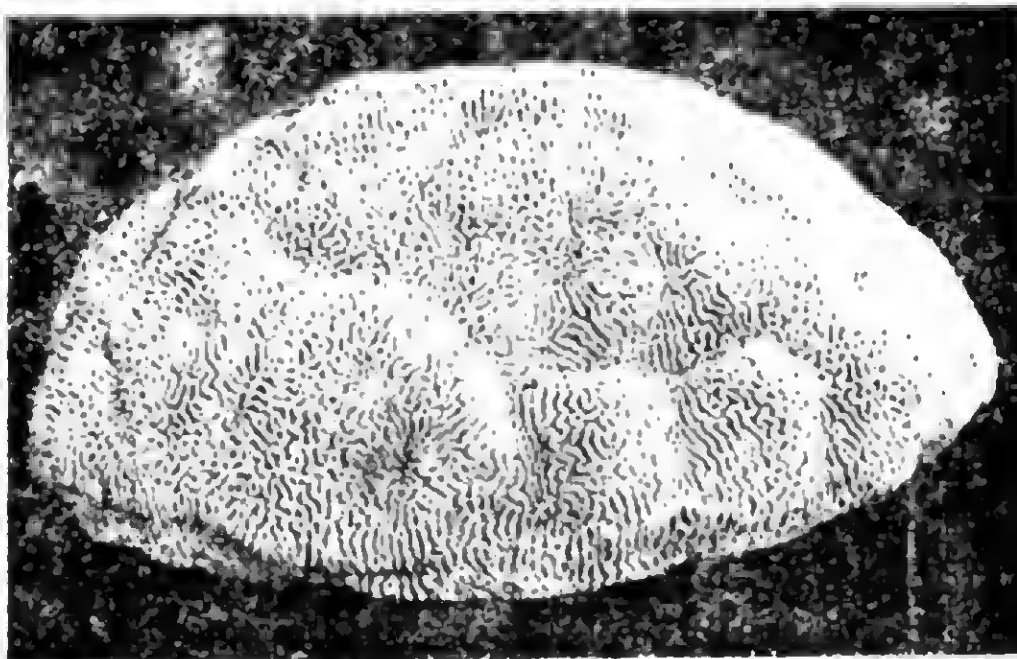


Fig. 116. THE BRAIN CORAL : *COELARIA ARABICA*

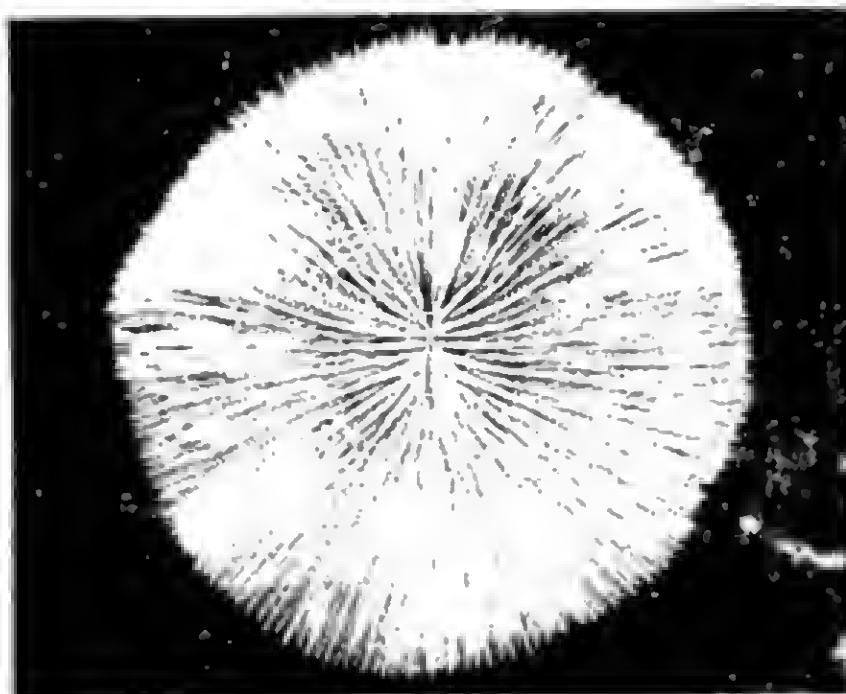


Fig. 117. THE MUSHROOM CORAL : *FUNGIA ECHINATA*

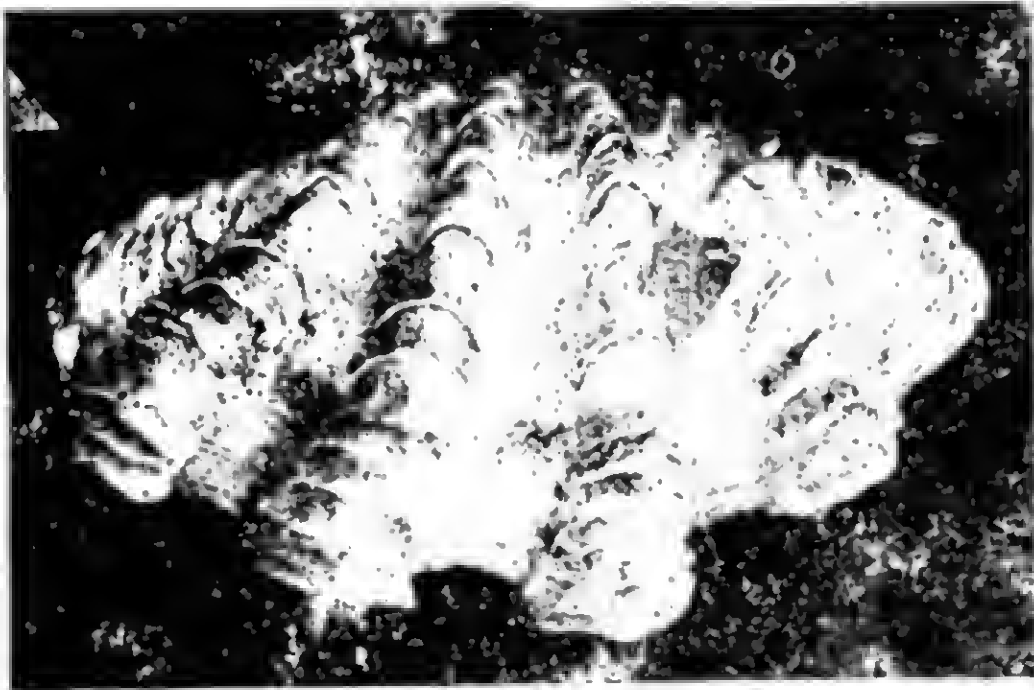


FIG. 118. THE GIANT CLAM : TRIDACNA CUMINGI : OUTER VIEW



FIG. 119. THE GIANT CLAM : TRIDACNA CUMINGI : INNER VIEW



Fig. 130. THE HELMET SHELL SHOWING CAMEO CARVING :
CASSIS MADAGASCARIENSIS



Fig. 121. THE KING CRAB : LIMULUS : UPPER SIDE



Fig. 122. THE KING CRAB : LIMULUS : LOWER SIDE



FIG. 123. 47. DIORAMA OF COPRA (NOLA NALL)



Fig. 124. THE DIORAMA OF STARRIED TORTOISE : *TESTUDO ELEGANS*



Fig. 125. A GENERAL VIEW OF THE MODERNIZED SHOW CASES IN THE BIRD GALLERY



Fig. 126. ONE NEW BUILT-IN CASE WITH THE EXHIBITS

GEOLOGY

By **M. S. CHANDRASEKHAR, B. Sc., F. B. S.**

(Curator, Botany Section)

The importance of rocks and minerals to us, either for food or for shelter, either for health or for pleasure, either for defence or for offence, needs no emphasis. In the Geology galleries the actual specimens, or their photographs, or models or diagrams are shown to the public, with explanatory labels, and the show-cases are provided with prominent index labels which serve as a convenient guide. The English and Latin labels are provided with translations in Tamil (the regional language) wherever possible.

It is impossible in this brief article to describe in full the large number of exhibits in the galleries and the multifarious activities of the Geology Section. Nevertheless, an attempt is made to give a generalised account of the principal exhibits and the important activities. The Geology galleries consist of a number of sub-galleries, such as (a) General Geology, (b) Rocks, (c) Minerals, (d) Economic Geology and (e) Fossils.

As soon as a visitor enters the Geology galleries, he has the unique privilege of facing the celestial bodies. These bodies instead of remaining celestial, have come down to the earth as a result of the latter's force of gravity, only to be collected as heaven stones or meteorites (Fig. 127). A plaster-cast model or replica (the original having been destroyed in analysis by the Geological Survey of India) of the meteorite that fell at Valudavur during a war year (1942), has an interesting tale to tell. Since it fell at about 5 p.m. when the sun did not set fully, its fall could not be seen by the people. The droning noise that accompanied it, however, was loud enough to have been heard in the whole neighbourhood, and was mistaken for the sound of an unseen enemy plane! The heavy thud and the cloud of dust, produced by the meteorite when it fell on the earth, were misinterpreted as denoting the fall of a bomb (probably from the unseen plane). But the Bomb Disposal Squad wasted no time in identifying it as only a meteorite. A couple of oil-paintings at the farthest end portray a comet as seen from the earth at dawn and a lunar landscape (with earth as seen from the moon). Through these means the lay visitor is given in vivid colours some ideas of other worlds and (natural) satellites.

A little to the left, is the General Geology series. It includes also all illustrations pertaining to the structure of the earth, its architectural details, etc. Thus we have a photograph of the earth from 100 miles up, a plaster model to show the internal structure of the earth, and a chart to illustrate the structure of the outer shell of the earth. A small model, prepared to scale, of the contour levels of the Madras City and its immediate neighbourhood reveals the location, at higher levels, of the different lakes that supply drinking water to the City. The architects of the earth's surface, that are referred to in these galleries, are water, plants, animals, wind, weather, and under-ground disturbances. The influence of these architects is mainly measured by the changes that take place on the earth, and the exhibits accordingly illustrate only these changes as far as practicable. For instance, they consist of valley developments, faults and folds, earth-quakes and volcanoes (illustrated by photographs and charts). Some of the interesting exhibits besides the photographs and charts are a water-cut tunnel, diatomaceous earth, exfoliating rock, Vesuvian lava, etc.

The rocks and minerals are arranged in two different ways, one with the object of showing their places in systematic studies and classification, and the other with the object of bringing out their importance in practical and industrial applications. The classification groups are important for, and best appreciated by scholars, hobbyists, and those who have any special interest in them. The minerals are arranged according to their chemical composition which is the basis for their classification. A couple of them are shown in Figs. 128 and 129. The rocks are arranged in the order of their origin which is generally the basis for *their* classification.

The practical and industrial applications of the rocks and minerals constitute Economic Geology, to which a large space in the Geology galleries has been provided. This gallery is very popular with, and much appreciated by, many a visitor, since the other exhibits call for some academic interest to understand them better. To describe the different groups that are accommodated under this head would require much more space than what is available here. Hence the principal exhibits alone are referred to in these pages. The practical application of rocks lies mainly in building and constructional works. A good many building stones are on display. Among them, the stones used in the construction of the Maharaja's Palace at Mysore, and the marble used in the sculpture of the Fort Church, Madras, desire special mention.

The group of precious and semi-precious stones, cut and uncut, is one of the most attractive groups in the Geology galleries. Their special interest lies not only in their rarity but also in the fact that they display a remarkable combination of such rare qualities as beautiful form and gorgeous colour, dependable hardness and durable strength, attractive lustre and high refractive index.

The exhibits relating to the manufacture of glass-ware, are both attractive and interesting. They comprise of the materials and photographs that are connected with the making of (1) block glasses, (2) glass beads, (3) Belan bangles, (4) Tarapore bangles, and (5) bottles, chimneys, and scientific apparatuses. There are sixteen block glasses, each of a different colour. The making of glass beads is illustrated stage by stage, commencing with bead rods and brass wires, and ending up with necklaces. Of them all the special, black, glass beads which are less than half the size of mustard, and which are provided with holes for stringing, are of international admiration. They go to show to what perfection and fineness human hands can work, and have remained, even in these days, a challenge to the machines. The making of Belan bangles from spirally-coiled glass rods, and of Tarapore bangles from twisted glass rods, is explained in detail. Actual samples and photographs depict the making of bottles, chimneys, and scientific apparatuses, as well as the stages in the manufacture of lenses from pebbles of rock-crystal.

Raw-materials for making saltpetre and sulphuric acid, abrasives and pigments, building cement and refractories, form small interesting units in the galleries. Among the refractories, is the vermiculite, a bomb-proof and heat-proof mineral substance that has been reported from Bangalore in recent years. Fire-clay and the refractory products derived from it are given adequate representation, since they are indispensable in all industries where-in heat-treatment, be it high or low, electrical or mechanical, is involved. To these may be added another small group of minerals that can be used directly or indirectly, as fertilizers. Included in this group but exhibited separately, are two large crystals of rock-salt from the Salt Ranges. They are interesting for their size and crystalline form. Each of them is a five-inch cube, and while one is white, the other is flesh-coloured.

The exhibits illustrating the extraction of gold also attract the masses. They consist of ore-samples and materials used in the

extraction of gold and a flow-sheet of the whole process. The principal element attracting the masses, is the presence of visible gold on some of the ores.

Minerals with radio-active elements are of no small interest, because of the ever-so-many uses to which the radio-activity of the elements concerned, is put. The exhibits under this head, include a chart of disintegration of Uranium (prepared in the Museum), Samarskite from Andhra State, Monazite from Kerala State, Thorianite from Ceylon, and Torbernite, Autunite, Euxenite and Carnotite from the United States of America.

A small group of exhibits focusses attention on some of the raw materials used in the manufacture of potteries, including porcelain-ware. Samples of soapstone and argillaceous clay, and a few pottery specimens made of them are given their due places. Under porcelain-wares, the exhibits chiefly consist of electrical appliances.

The lignite industry of S. Arcot Dt. is comprehensively represented. The exhibits consist not only of lignite samples and briquets, but also of a few other materials relating to some of the subsidiary industries that could be started at the site eg.: potteries, refractories, etc.

The Fluorescence Box in the Geology galleries, illustrates the phenomenon of fluorescence by minerals when they are exposed to ultra-violet rays. The ultra-violet light which is invisible and for that reason, is known also as black light, is obtained from a special bulb fitted into the Box. By the side of this bulb, is an ordinary incandescent bulb. The two bulbs can be connected to the mains by a common switch, but not simultaneously, i.e., when one light is on, the other light is switched off. A set of minerals all of about the same colour, are so placed in the Box as to be seen only through a projecting window which shuts out the bulbs from view. The minerals used are Quartz, Aragonite, Calcite and Fluorspar. They all appear to be white in colour under the ordinary incandescent light which they reflect. When the ultraviolet light is switched on (and the ordinary incandescent light is automatically switched off) the minerals absorb energy from the ultra-violet rays and re-emit the same in the form of visible light. The visible light that comes from the minerals, varies in colour from mineral to mineral, depending upon the optical characteristics of the mineral concerned. This phenomenon, known as fluorescence, is of extensive application in medical treatment and Criminology.

The fossil series open with an introduction to the different geological periods, and then lead on to the remains of past life (fossils) that existed in those periods. They include samples of beds of a few important geological strata (of which the flexible sandstone is of popular interest). The fossils are arranged in the order of their stratigraphical sequence and mostly belong to the animal kingdom, especially the invertebrates. Some plant fossils from the Gondwanas are also there. Among the animal fossils the model of an extinct reptile, *Brontosaurus* (Fig. 130) is rather a thought-provoking exhibit. This model is 1/25th the size of the original reconstruction in America, of this particular reptile which is ranked as one among the largest animals that ever roamed on the earth. The fossil fauna of the Cretaceous period, in which the Thiruchirapalli District abounds, are interesting for their variety. A set of sharp, pointed teeth of *Lamna* (a prehistoric fish) and the fossil of a giant specimen of an *Ammonite* (Fig. 131) are worthy of special mention. The Siwalik fossil casts include the jaw bones of our *near* relatives who lived only a few millenia ago. For some of them belong to the apes like *Sivapithecus indicus*, *S. sivalensis*, etc. that lived in the Siwalik period. The largest fossil in the collections, both casts and originals inclusive, is the fossil skull of a Ceylon elephant (*Elephas indicus ceylonica*). This is presumably of recent times (in the geological time scale).

All duplicates, triplicates, etc. and those materials which for some reason or other, are not exhibited in the public galleries, are separately stored as reserve collections. They are accessible to scholars and research-workers and to those who are directly interested in the subject. A special mention may be made here of a vast collection of Cretaceous fossils hailing from the Thiruchirapalli District, ores of radio-active elements, and double-refraction calcite (Fig. 132).

Other activities:—Special exhibitions are periodically arranged in order to give publicity to the new accessions and important older collections. Participation in educational exhibitions is becoming more and more frequent. Guidance on matters of collection, identification, preservation, storage, etc. is freely given (in the form of advice or references) to educational institutions, museum-keepers, industrialists and others. Periodical demonstrations are held to organised parties of teachers, on how best they could enable their pupils to make a profitable visit to the galleries. Short condensed courses on organization

and maintenance of geological museums, are also conducted for batches of teachers from different parts of the State. Personal help round the galleries, is freely given to illiterate visitors if they turn up in organised batches. Under publications, mention may be made of "Rocks, Minerals, Fossils, etc.—Collection and Preservation" in the Handbook of Museum Technique that was published by this Museum recently. The Geology Section of the Museum was managed by a succession of Botany Curators till 1961, when it was placed under a separate Curator.



Fig. 127. COLLECTION OF METEORITES

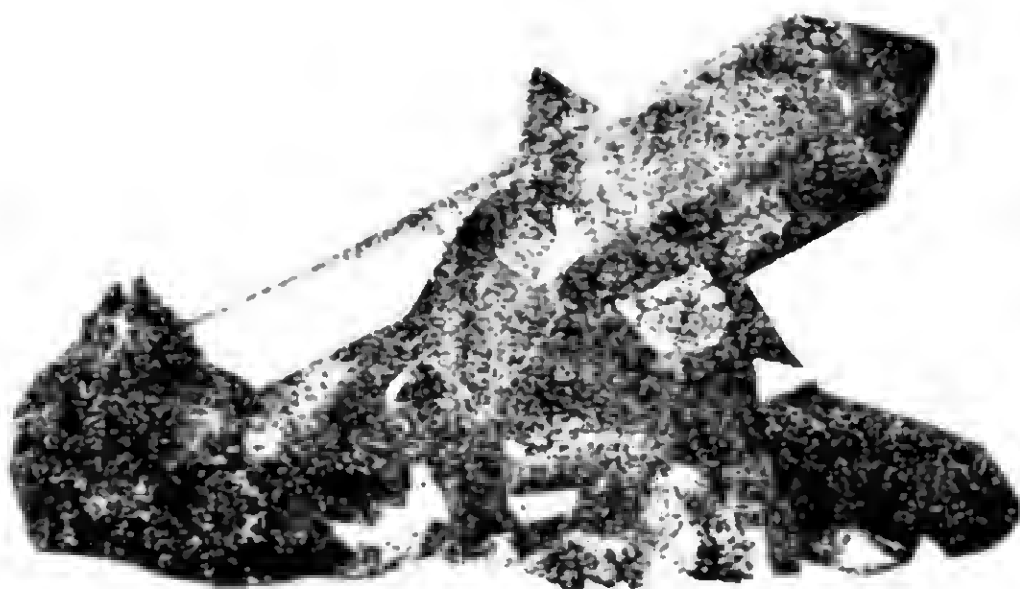


Fig. 128. CRYSTALS OF SMOKY QUARTZ

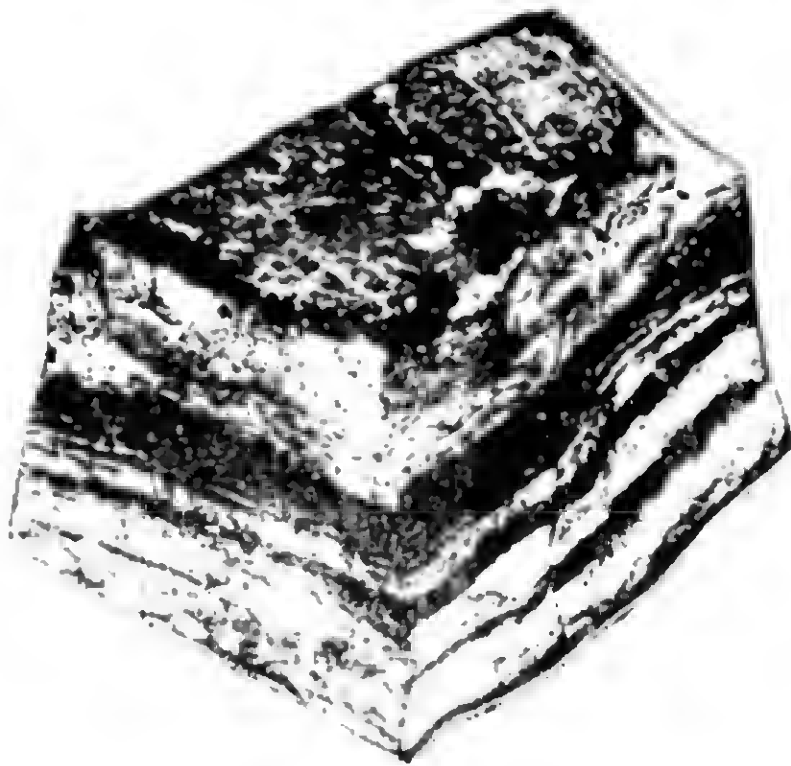


Fig. 129. BONE OF A LARVA OF THE JASPER

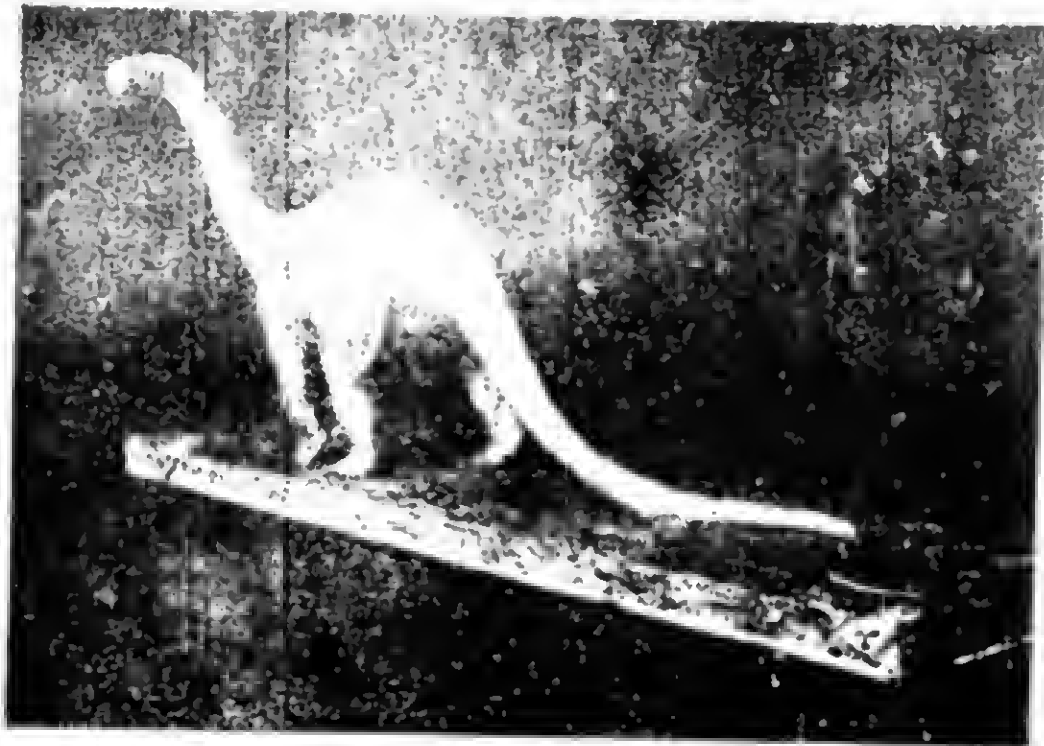


Fig. 130. BRONTOSAURUS sp.



Fig. 131. AMMONITE, sp.



Fig. 132. DOUBLE REFRACTION IN CALCITE

BOTANY

By

M. S. CHANDRASEKHAR, B. Sc., F. B. S.

(Curator, Botany Section, Government Museum, Madras)

The importance of plants in our daily life can hardly be over-estimated as most of the things we need, have got their origin in some plant part or other. Our country is very rich in natural resources, and the need for a good number of imports can be overcome with the help of a knowledge of the various plants and parts of plants from which the raw materials can be tapped to the best advantage. In the Botany galleries, the actual specimens or their photographs, or models, or diagrams are placed before the public, with explanatory labels which are brief and to the point. The different groups of exhibits are explained by descriptive group labels which serve as a good guide. The English and Latin labels are provided with translations in Tamil (the regional language) wherever possible.

It is impossible in this brief article to describe in detail the large number of exhibits in the galleries and the multifarious aspects of the botanical work carried on in this Museum. Nevertheless an attempt is made to give a general account of the principal exhibits and the more important activities. The Botany galleries are divided into sub-galleries, the topics illustrated in these galleries being broadly divisible into (a) Systematic Botany, (b) Ecological Botany and (c) Economic Products.

In the part of the gallery devoted to Systematic Botany the exhibits are arranged in their natural order, starting with the primitive Cryptogams. They are too many to be referred to in detail, the families of flowering plants alone numbering over one-hundred-and-fifty. They are of interest not only to the botanists but also to the general public. To mention a few, a couple of Hemp Plants (*Cannabis sativa* Linn.), which are exhibited with root and all, are rare objects, since their cultivation and possession are a closely-guarded monopoly of the Government. There is a toadstool of clumped growth and gigantic size (fig. 133). It is one foot tall, the stem (known as the stipe) having a circumference of eight inches, and the top (known as the pileus) having a diameter of seven inches. It is a giant of its kind, indeed! There are also huge bracket fungi which grow from the trunks

of trees, appearing like protruding, wooden shelves. They are generally confined to forest tracts and are not commonly seen by the public. The largest specimen in the collection, measures more than a foot in diameter and at least three-and-a-half inches in thickness. A group of mosses, the amphibians of the plant kingdom, form another source of attraction. The specimens hail mostly from the Nilgiris and the Bababudens. Two of them from Madras, are given a special treatment and preserved *with* colour. A life-cycle of these plants, sketched in black and white, lead the visitor on to the academic fields. A specimen of moss, preserved dry and mounted on a card, is shown with its different parts labelled. The interest in these tiny plants is stirred by a set of eight, enlarged models that portray many of the important features. Bunches of inflorescence and fruits of Coconut palm and Arecanut palm, offer a close-up view (Figs. 134 & 135). Herbarium sheets of the flora of the City of Madras, are accommodated in drawers which are specially devised for them. Residents of the City derive help from these exhibits in identifying plants which they see in their neighbourhood.

In the section devoted to Ecology in the botanical galleries, the exhibits illustrate the changes in vegetation during the formation of swamps from stagnant water, the growth of grassland and scrub vegetation on rocky soil, the vegetation in dense evergreen forest areas, the vegetation on sands, the struggle among the mangroves for existence, weeds growing in the sea and the phenomenon of cross-pollination through the agency of insects. The vegetation on swamps include insectivorous plants which command popular interest. These plants have taken to an insectivorous habit, for obtaining their share of Nitrogen as the nitrogenous salts in the swampy soils get frequently leached out by rain and run-off water. The Nitrogen contained in an insect, is made into Ammonia after the insect is trapped and starved out to death. The inner lining of the insect-traps (which are only suitably modified leaves) have the special ability to absorb Ammonia, both as vapour and as solution. *Drosera purmanni* and *Nepenthes distillatoria* are the insectivorous plants on display. Models and charts of the insect-trapping mechanism in *Sarracenia purpurea*, *Dionaea muscipula* and *Nepenthes* sp. (Fig. 136) render the subject easy to understand. Many visitors who have seen these exhibits and understood them, have expressed an urge to see the actual specimens with insectivorous habit in the field.

The exhibits illustrating the vegetation in the dense evergreen-forest areas, include a tree-bark on which lichens, mosses, a clubmoss, and even flowering plants (an orchid and a peperomia) are seen growing. The exhibit is only a typical instance of the competition for space in the dense evergreen forests.

The way the mangroves solve their life-problems, is an interesting subject for study. The soil of the mangroves is loose and muddy without any air-space, and in the form of marshy islands in shallow, stagnant sheets of brackish water. The exhibits illustrate many of the special devices with which the mangroves manage their affairs in the saltwater swamps. The mangroves keep their centre of gravity as low as possible, by not attaining any great stature. Their roots radiate generally for long distances; and in certain cases they spring from the sides of the stem, run horizontally, curve down and strike the soil at a distance. In some other cases the aerial roots originate from the heavy branches, grow vertically downwards and support the weight of the latter. The mangroves possess also pneumatophores (or breathing roots) which grow vertically up from below the water-clogged, muddy soil and supply air to the underground roots (fig. 137). The principle of providing for the young, is practised by the mangroves in an interesting way. Some of them allow the seedling to grow from the fruit even when the latter still remains attached to the parent plant. This practice is more or less comparable with vivipary in animals.

An ecological exhibit of great interest to the lay men, is a model to demonstrate insect-pollination of flowers. This model (fig. 138) is exhibited in a small separate show-case. It illustrates how the phenomenon of cross-pollination is generally effected in flowers by insects. It consists of a fixed model of a two-lipped, tubular flower (*Salvia*) which is cut up longitudinally. A stamen is movably fixed in the flower. There is also a model of a bee resting apparently on the expanded lower lip of the corolla. The manipulation of a small handle can take the bee into, or out of, the flower, when the (movable) stamen acts as in the real flower.

The Economic Products gallery is by far the most popular, since both the preceding galleries call for at least some background of botanical knowledge to appreciate the exhibits, and since a vast majority of the specimens are displayed in special, built-in-wall show-cases that are designed on the most modern lines (Fig. 139). This gallery consists of vegetable raw materials

of all kinds, including agricultural products, timbers, minor forest products, etc. The exhibits are divided into several groups according to their uses. The abundance of information furnished to botanists, industrialists and the general public, can be appreciated best only by a personal visit.

There are over 300 exhibits of the various South Indian timbers. The most impressive among them are transverse sections of large trunks of two timber trees. One is rose-wood (*Dalbergia latifolia*) and the other, teak-wood (*Tectona grandis*) (fig. 140), the circumference of the former being twenty-one feet, while that of the latter, twenty-three feet and nine inches. The rose-wood is claimed to be 200 years old at the time of felling, and the teak-wood, a little over 500 years. The age is calculated by counting the number of annual rings on the specimen, each ring corresponding with a growing season of each year of the plant's life. Starting from the centre, every hundredth ring on the specimen of teak-wood, is painted in white so as to represent the circumference of the plant at the end of every 100 years of its growth. The size of the trunk in the year, 1400, when the tree began growing, is indicated by a dot. Mentioned on the specimen, are also a few historical events, with dates, that took place during the life-time of the tree. The markings rouse some special interest, even in the lay visitors, in the study of the economics of timber. A skeleton of the White Sandalwood tree (*Santalum album*, Linn.) is the very first exhibit to greet the visitor at the head of the stair-case leading to the Botany galleries. The skeleton (or the heartwood, as it is more accurately called) is exhibited in two parts, the portion of the main trunk alone forming one part, and the rest of the skeleton forming the other part. Since both these parts are exhibited one beside the other, it is easy to estimate the height of this particular tree (when in life) as about thirty feet. The Sandalwood oil which is so highly valued for its fragrance all the world over, is extracted from the heartwood which is also highly valued for carving purposes. Some of the principal types of timber suited for making toys are exhibited in the show-cases devoted to toy-manufacture. The changes they undergo before taking up the shape of the completed toy, are also illustrated stage by stage.

Bamboos, the tallest and the most graceful members of the family of grasses (fig. 141) are quite uncommon as *live plants* in cities, but the numerous uses to which their stems are put, are more than familiar to almost everyone. A cluster of bamboo rhizomes

(fig. 142) with the bottom-most internodes exhibited in this gallery, illustrates the mode of vegetative propagation in bamboos. The yellow stems hidden by green leaves and their dark shadows, give ample protection to the similarly coloured animals the most dreaded among them being the tigers. The stems of different species of bamboos are of different sizes and strength; and the stems of some of the chief species are well preserved and displayed in the galleries. The stems are finely split and the splittings are dexterously woven into many an article of domestic use on a cottage industry scale.

The group of exhibits of articles of food contain about fifty different strains of paddy (and rice) wheat grains, different kinds of millets, etc. They are attractively displayed and have been rendered more instructive and interesting with the aid of photographs. Many of the spices and condiments on show are not new and include also such important articles as the pepper, cloves, cardamom, etc. It has been found in practice, that these common articles, while on display rouse fresh interest and enthusiasm among the visitors. Included in their midst, is also a newly-imported material, the Chinchweed (*Pectis papposa*). It is an American plant and its cultivability in Madras has recently been attempted with favourable results. It can be used in flavouring food and beverages.

Space will not permit the enumeration of the thirty, different, oil-yielding plant materials and forty-five different vegetable oils which are displayed in this gallery. A model of the indigenous type of bullock-driven oil-press cannot escape admiration from those who come from afar. This exhibit consists of mortar and pestle, a pair of bullocks and their driver. A long jointed lever, moved round and round in the horizontal plane by the bullocks, causes the pestle to turn in the large mortar where-in the oil is squeezed out of its raw materials.

The beverage group is well represented among the exhibits. Plants yielding the materials for the three popular drinks, cocoa, tea, and coffee, have been given the place they deserve. There are two specimens of pods of the Cocoa plant (*Theobroma cacao*, Linn.). Of them, one is entire and the other, cut open to show the inner beans which are cured, roasted and ground to form the cocoa of commerce. The exhibits illustrative of the tea industry include actual specimens and photographs relating to the cultivation and processing of tea. Interesting among them, will be found the adulterants too, some of which are rather shocking indeed! The

coffee series includes a map showing the coffee-cultivation areas in South India, and photographs and specimens of cultivation, harvesting, etc. of this useful crop. Not only these drinks but also sweet-meats, confectionery and a host of other eatables require sugar which is principally obtained in India from the sugar-cane plant. The sugar-cane exhibits speak of the poor quality of the original indigenous canes, and also of the sturdiness and better quality of the improved strains that are bred in the sugar-cane research stations. The distribution of these stations and the sugar-factories, is shown in attractive charts. The range of parents for sugar-cane breeding is also indicated photographically.

In the Economic Products galleries, the sea-weeds are also exhibited, as of economic importance. Even in the early days the value of sea-weeds was recognised. The sea-weeds were used as human food and cattle fodder, medicines, and as sources of soda, potash and iodine, and for sizing silk. In recent years their value has gone up as the source of agar, algin, carrageenin, iridophycin, mannitol, laminarin, fucoidin and iodine—the first two being the most important of them all. The edible sea-weeds are washed in water, dried in the sun, sprinkled with lime-juice and flavoured with salt and spices. They may be added to salads, cutlets, etc., or cooked in other ways.

The narcotics are given the place that is their due in the galleries. The tobacco industry is as adequately represented as possible. The exhibits illustrate the cultivation and uses of tobacco, and include the different tobacco materials, raw and prepared, as well as their wrappers. Various stages in the cultivation and processing of the drug, *Cannabis sativa* Linn., popularly and locally known as the *Ganja*, are illustrated photographically. It is a powerful narcotic, and its cultivation is a monopoly of the Government.

The principal exhibits of raw materials for raiment, are the four chief kinds of commercial growths of Indian cotton. The group is rendered interesting with the aid of photographs of cultivation and ginning of cotton, and with the different strains dissected to show the staple length. The most interesting exhibit for the lay visitor, however, is the miniature model of a hand-loom. A small piece of cloth is also shown half way in the process of being woven by this model. Plant materials that are used as dyestuffs for several purposes, including designs on cloth, are also exhibited. Many of the dyes which are obtained

from the indigenous plants, are valued highly for their permanence. It was only with the help of these dyestuffs that the Indian cottage industries in textiles ruled the textile markets abroad till the advent of the East India Company who began to imitate the Indian designs, but with chemical or synthetic dyes. The faster production of cloth with much brighter, though fleeting, colours by the East India Company, crippled the Indian trade. The old industry is now receiving untiring patronage from the Government and Public bodies, for revival on improved lines so that the products could not only be of dependable character but also cater to the tastes of the people at home and abroad.

Manufacture of leather goods is an important industry in the fore in India, today. Leather is mainly obtained by tanning the skin or hide of an animal with the help of certain raw materials. The raw materials may be certain chemicals, or minerals, or plant materials. The plant materials required for the tanning industry, form a small but important group in the galleries.

Medicinal plants and their products occupy a considerable amount of space in the galleries. Despite this, the exhibits are not exhaustive; they cannot be so, considering the fact that the plant materials used as drugs are far too many for the available accommodation. Only some of the more important medicinal plants and their products have been exhibited. One among the exhibits is the plant, *Ephedra vulgaris*, which grows throughout the Himalayas, and which does not grow in South India. It is perhaps from such plant as this, that the Vedic Brahmins used to obtain their Soma juice, an intoxicant. Writing on this small group of exhibits of medicinal plants, mention must be made of the Cinchona plants and their products. The bark of Cinchona plants contains several alkaloids, the most valued among them being quinine. Though there are over thirty species of Cinchona plants with numerous hybrids and varieties, the commercial barks are obtained only from about a dozen species. The exhibits are herbarium specimens, coloured pictures and barks of a few important species of the Cinchona plant and samples of medicines with quinine.

The exhibits of domestic articles go to show to what extent the dexterity of our artisans can shape seemingly trifling materials into beautiful handicrafts. We have the mats and baskets made of rattan, thatch grass, palmyrah leaf, etc. Specially

appealing to the fair sex among the visitors, are the ladies' hand-bags that are very attractively made of seeds of *Acacia concinna*, *Adenanthera pavonina* and *Bauhinia tomentosa*. The series of mats shows the different stages in the weaving of screw-pine mats that are so soft to the feel. They include also a *Brahma Yoga Dharbasana* (a mat, made of the *Kusa* grass), and Pattamadai mats (made of the sedge, *Cyperus corymbosus*). Of them, the Pattamadai mats are reputed for the excellence and fineness of their quality. A quality Pattamadai mat can be folded like a cloth and carried in a small suit-case. The Pattamadai Village naturally has every reason to be proud of the mat of this kind.

A vast and choice collection of vegetable fibres are attractively displayed and grouped into (1) Jute and its substitutes, (2) Cordage, (3) Brushes, (4) Coir, and (5) Miscellaneous fibres. All these five groups consist of both raw materials and their finished products. The Jute series includes long stems of the Jute plant (*Corchorus olitorius*), which are objects of rarity in South India. The cordage series includes whip-cords, made not only of cotton yarn, but also of date leaf and paper (in a fanciful way!) The brushes series (fig. 143) illustrates how some of the raw materials can be used straight-way without much of the processing work. The coir industry is an important cottage industry in the West Coast. Tapping the raw materials and their subsequent treatment till they could be marketed as finished coir-products, are explained stage by stage with photographs. Samples of different grades of coir-fibres (*Cocos nucifera*), yarns spun out of them, ropes, belt, sole, mats, etc. that are made of them, are also well displayed. The miscellaneous series consists, besides others, of a set of different strains of plantain fibres which, by their different, attractive colours, render this entire group of exhibits very colourful. A cloth made of Banana fibres (*Musa paradisiaca*) is indicative of the multifarious uses of these common raw materials.

A remarkable specimen of the bark of the "Upas tree" (*Antiaris toxicaria*), measuring over 5½ feet x 3 feet, never fails to attract the visitor's attention. The "Rishis" of yore perhaps clothed themselves in such barks as this! In some parts of the Western Ghats, it is still employed as a ground sheet while its chief use is in making bags and paper.

Raw materials required for making paper and rubber are also exhibited. The exhibits relating to the manufacture of

paper, show how most of the wastes that are thrown into the dust-bin, can be profitably utilised in making paper. The exhibits connected with rubber-manufacture are interesting as many of them cannot be commonly seen. They consist of a photograph of how rubber is tapped from the tree and the tapping implements, specimens of the stem of the Para Rubber Plant (*Hevea brasiliensis*), and samples of the solidified latex, treated and untreated.

All duplicates, triplicates, etc. and those materials which for some reason or other, are not exhibited in the public galleries, are separately stored as reserve collections. They are accessible to scholars and research-workers, and to those who are directly interested in the subject. A special mention must be made here, of the collection of textiles (which are a few rare specimens of our art and industry), and of the herbarium (which, in this State, is second only to the Madras Herbarium at the Agricultural College and Research Institute, Coimbatore).

Other activities :—Special exhibitions are periodically arranged in order to give publicity to the new accessions and important older collections. Participation in educational exhibitions is becoming more and more frequent. Guidance on matters of collection, identification, preservation, storage, etc., is freely given (in the form of advice or references) to educational institutions, museum-keepers, industrialists and others. Periodical demonstrations are held to organised parties of teachers, on how best they could enable their pupils to make a profitable visit to the galleries. Short condensed courses on organisation and maintenance of school herbaria and botanical museums, are also conducted for batches of teachers from different parts of the State. Personal help round the galleries, is freely given to illiterate visitors if they turn up in organised batches.



Fig. 133. THE GIANT TOADSTOOL, WITH A SIX-INCH SCALE

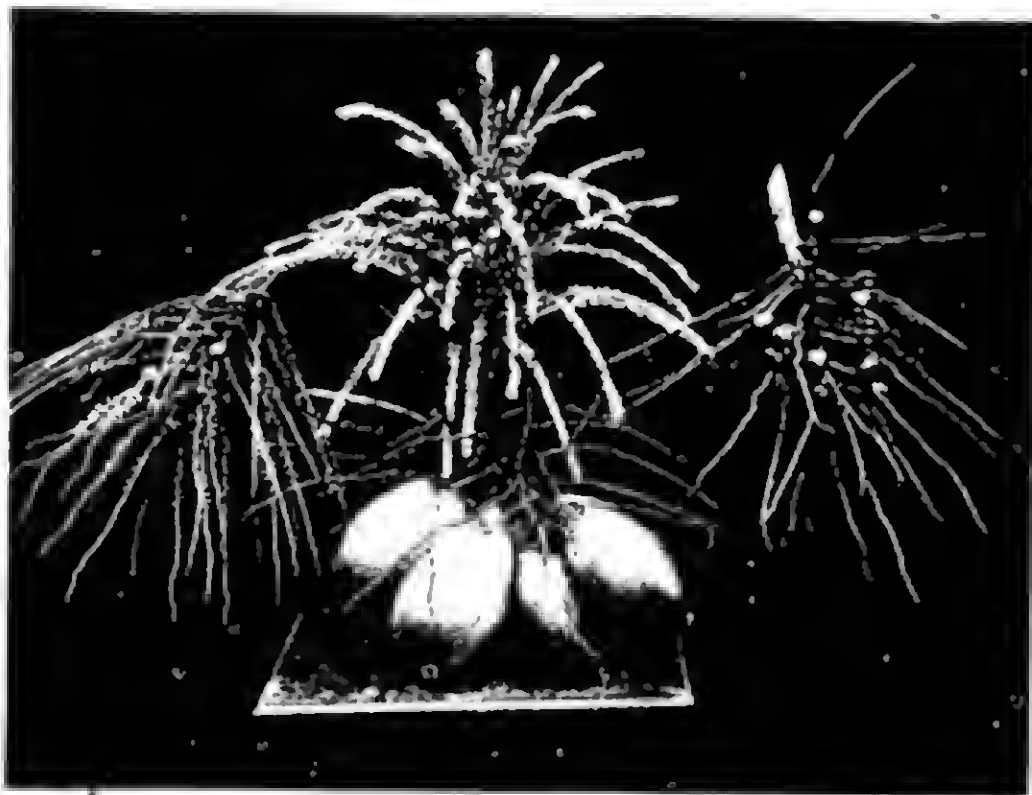


Fig. 134. THE COCONUT INFLORESCENCE AND FRUITS



Fig. 135. THE BUNCH OF ARECA-NUTS



Fig. 136. THE INSECTIVOROUS PLANT (NEPENTHES SP.)



Fig. 137. THE MANGROVES WITH BREATHING ROOTS

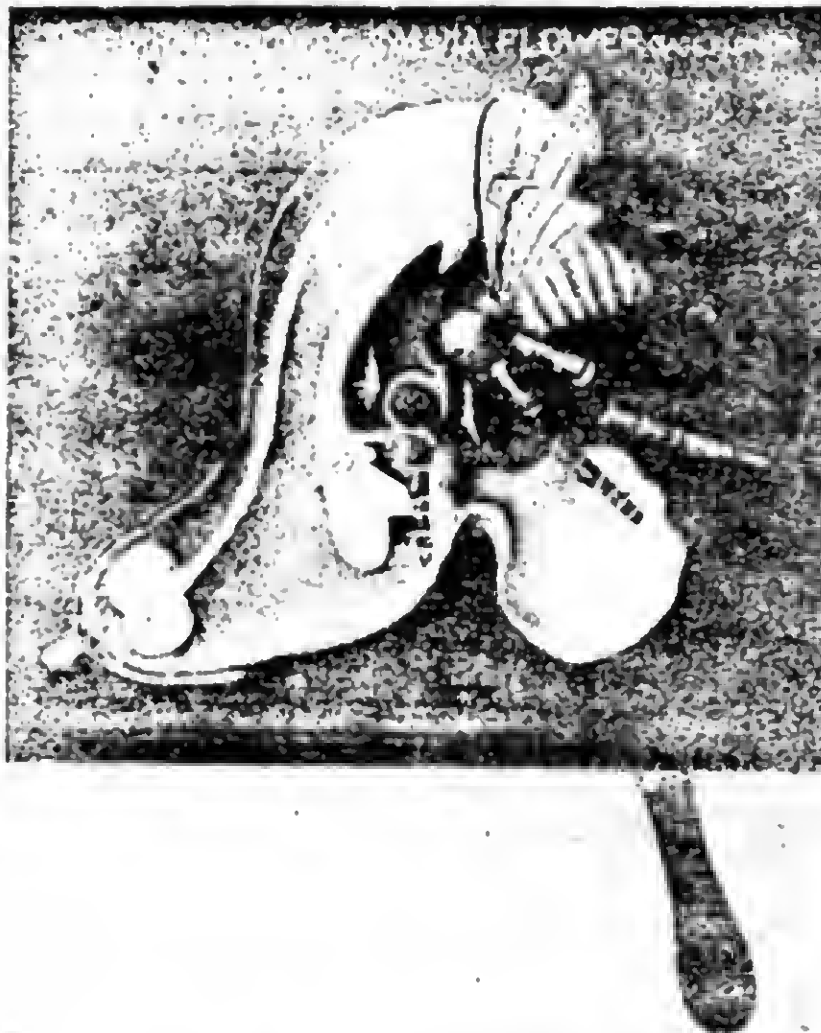


Fig. 13A MODEL SHOWING POLLINATION OF
A SALVIA FLOWER

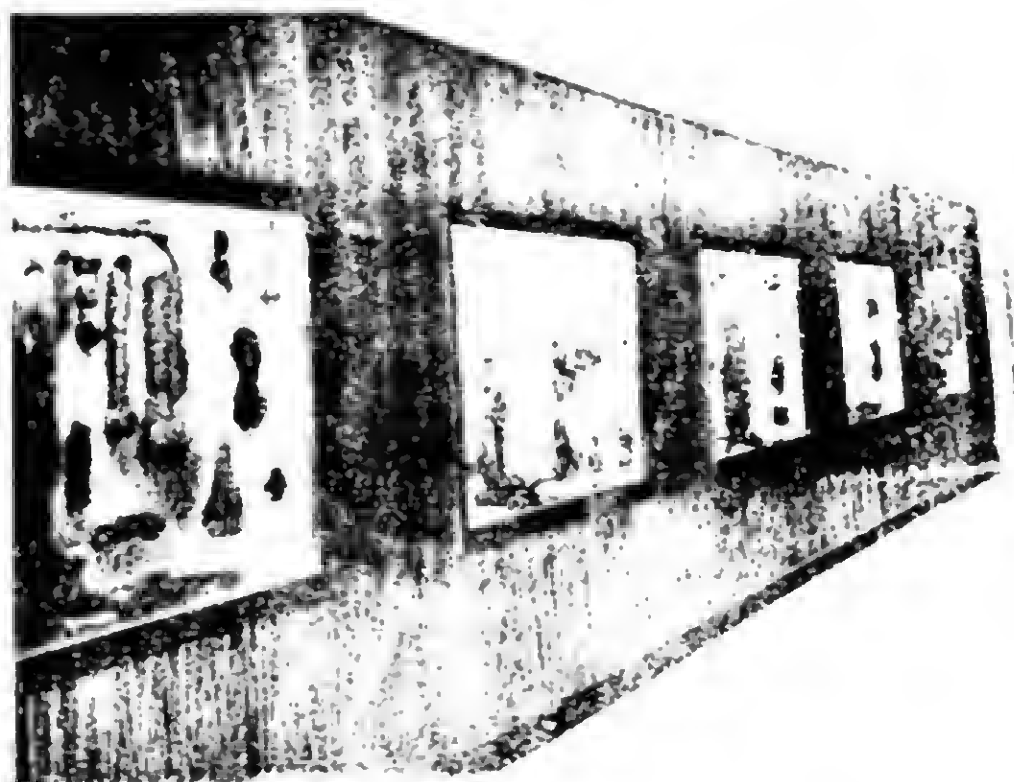


Fig. 139. A VIEW INSIDE THE ECONOMIC PRODUCTS GALLERY

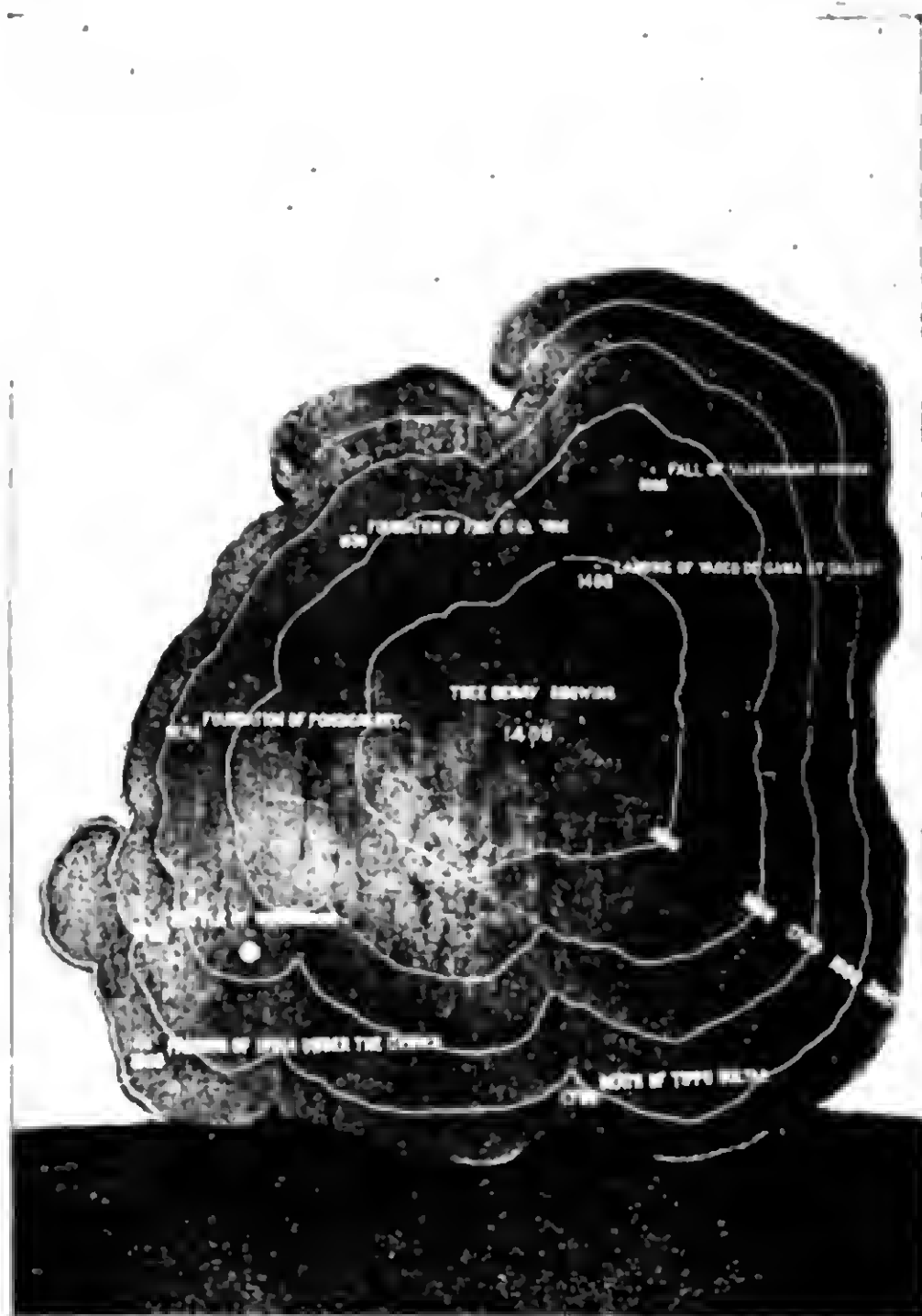


Fig. 140 CROSS-SECTION OF A LARGE TEAK-WOOD TRUNK



Fig. 141. THE BAMBOO



Fig. 142. THE BAMBOO RHIZOMES

PLATE XCIX

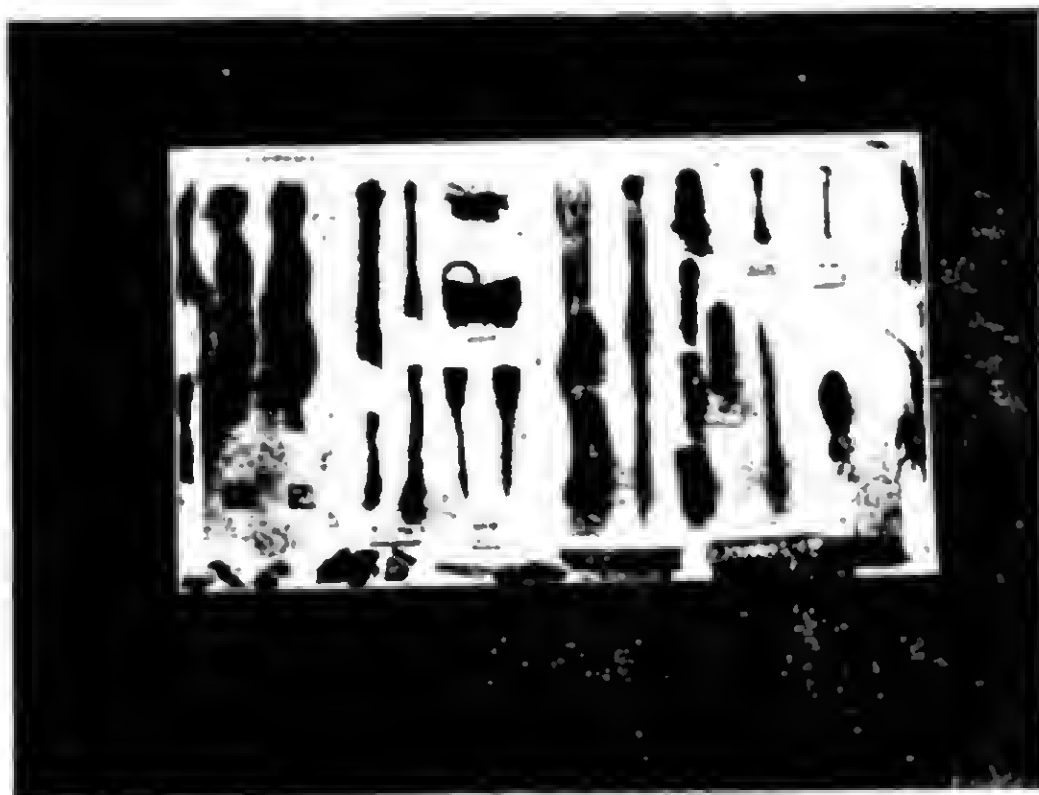


Fig. 148. THE BRUSHES SERIES

CHEMICAL CONSERVATION SECTION

By

N. HARINARAYANA, M.A., B.Sc., (Tech.)

(Curator, Chemical Conservation Section)

In the century-old Madras Government Museum, the Chemical Conservation Section dates back to 1930. It owes its existence to the forethought and vision of Dr. F. S. Gravely, then Superintendent of the Museum.

The Madras Government Museum has a rich collection of ancient bronzes, some of them being the largest in the world. Their preservation in the moist and saline atmosphere of Madras was a serious problem. In 1929, the problem became so acute that the Museum authorities consulted the Archaeological Survey of India and wanted to employ a chemist. On the advice of the Archaeological Chemist in India, one of his assistants, Mr. Ram Singh was appointed for a brief period of six months to take up the preservation of bronzes. At the end of this period, Prof. Erlam Smith of the Presidency College was consulted in the matter. He suggested the electrolytic restoration of bronzes, which had been developed by Colin J. Fink of the Metropolitan Museum of Art, New York and had just then come into vogue in American museums. Dr. S. Paramasivan was appointed as the first Archaeological Chemist in the Madras Government Museum to take up this work. The electrolytic restoration work in U.S.A. had been confined to comparatively small bronzes. Hence electrolytic restoration of these large bronzes in this Museum necessitated the development of the requisite techniques including the devising of the electrolytic plant for this purpose.

The process of electrolytic restoration was adapted suitably to the needs of the Museum bronzes which had defacing crusts. The crusts were removed by this process and the ornate details underneath exposed. The restorations were successful and the bronzes regained much of their beautiful original appearance. Sir Richard Gregory F.R.S., Editor of "Nature", visited the laboratory in 1932. He was so much impressed with this work that he made a special mention of the electrolytic restoration of metallic objects carried out here in a press interview at which he

spoke on 'Scientific work in India'. Again the Museums Commission, headed by Mr. S. T. Markham and Mr. H. Hargreaves, that visited the Museum in 1935, was so much struck with the scientific restoration done here that it recommended that preservative treatment of antiquities other than bronzes should also be brought under the purview of the Archaeological Chemist. This led to the expansion of the Conservation Laboratory and to the construction of a special building into which the laboratory moved in 1937. Over the years, the work of the Laboratory came to be extended in scope, and now a two-storied block has been added to the Laboratory in September 1963 and more equipment is being acquired for it to facilitate this wider scope of its work.

Background to chemical conservation:—Chemical conservation is very important if museum collections are to be kept in good condition. Every object that comes to the museum—be it a bronze image, a marble frieze, a copper coin, a historic document, a prehistoric pot, a wooden panel, or a leather belt—comes in a state of decay or in a condition likely to worsen with time. Even were it to be found in a sound condition, there are its enemies lurking everywhere—in the gases of the atmosphere, in the dampness of the air and in the insects, fungi and other minute organisms that may infest the place. It is the task of the chemical conservator not only to win these antiquities back from the ravages of centuries of burial under the earth or exposure to the elements but also give them such protection as would enable them to retain their restored appearance for years. But the treatment that he gives differs from material to material, from object to object. For example, what may be a suitable process for copper may be quite unsuited for iron; the methods used to restore leather will be inadequate for ivory. What is more, the methods also vary for the same material, say iron. What is safe for a piece of iron with a well-preserved core of metal will be unsafe for another iron object which is heavily mineralized.

Every antique that comes to the chemist's laboratory for restoration must be examined carefully as to the material of which it is made, the extent and the nature of the decay it has undergone, and the processes it can be safely subjected to. The actual treatment is done only after this preliminary examination is over and after deciding on the suitable method. Patience is of the very essence in chemical conservation. The use of strong acids, rough brushes, hasty washing for getting quick results is

always to be avoided. It does not matter if the cleaning takes a little longer time so that the restored object will last unaffected much longer.

*Nature of work in the laboratory - General Survey:—*It is on these basic principles that antiquities of different kinds have been treated and restored successfully by the Chemical Conservation Section. They range from the exquisite bronzes that had been eaten into by corrosive salts to excellent paintings on temple walls that had suffered every abuse at the hands of man and weather, from intricately carved marble friezes that had their surfaces peeled off because of damp and salt to fine leather objects that had become brittle and hard and parched. Hoards of ancient coins, which had been dug up as treasure troves, come to the Museum, all covered with thick crusts of corrosion products and gritty material, and sometimes they are found sticking together in a lump; chemical treatment removes the crusts and gritty particles, separates the coins, makes clear obscured details enabling the numismatist to study and decipher them. Moreover a coat or two of a protective solution keeps off the corroding influences from the coins and helps them retain their restored bright appearance for a long time. Many other miscellaneous objects arrive, each posing its own problem in restoration, and each gets the scientific treatment it requires.

*Details of the work in the laboratory:—*In any account of the work of the Chemical Conservation section of the Government Museum, Madras, the method of electrolytic restoration adopted here, deserves pride of place. The method itself is nowadays commonly used for restoration of metallic antiquities, but what is unique about its application here is the large scale on which it is done.

The bronze images of South India are as impressive in their size as in their sculptural excellence. There are among them images which range from 2·5 feet to 4 feet in height. Some of them measure more than 2·5 feet across. There are a few pieces which are larger in dimensions. Consequently if they are to be electrolytically treated, the equipment employed must be larger than normal.

In American museums, where the electrolytic process was first used, they had to deal with bronzes which were 10 to 15 inches in height. But bronzes in the Madras Museum range in

size upto 4½ feet. As Dr. Paramasivan remarks, "The former is analogous to a laboratory scale of work and the latter to the industrial scale, which demands a technique of its own. The difference may be realised better from the fact that the maximum power output in American Museums is about 100 watts, while in Madras it is about 7000 watts."

So special apparatus designed by the Metropolitan-Vickers had to be installed for this purpose. This consists of three cast-iron, cylindrical cells of different sizes for installing images of different dimensions (fig. 144). These cells are insulated from the ground by being made to stand on porcelain supports. They are connected in parallel to the generator of a motor-generator set. The motor is run on 440 Volts D. C. from the mains and it works the generator which produces a direct current of 110 volts. An instrument panel has also been set up from which it is possible to regulate the working of each of the three cells as well as take readings of the voltage and amperage of the current (fig. 145). The output can be adjusted to any desired voltage. The walls of the cells themselves act as the anode and the metallic object to be treated is made the cathode. A 2% solution of caustic soda is the electrolyte.

This process is based on the principle that corrosion is mainly an electro-chemical phenomenon. Moreover it is oxidative in nature. If it could be reversed, the crusts of corrosion products formed on the image will be reduced to the metallic state *in situ*. Where the crust formed has separated from the still unaffected metallic surface underneath, the reduced metal can be washed off as fine particles; where it is just being formed, the metal is likely to be restored to its original condition. All in all, this provides a gentle means of winning the image back from the harmful crusts of corrosion products.

Usually the images are kept in the cells without any preliminary treatment (fig. 146). Immediately a sludge consisting of the siliceous material in the image is formed and it is augmented in the first 2 or 3 days of the working of the cell. The sludge comes upto the surface and floats on top, and it is gently skimmed off on the third or fourth day. The images are kept in the electrolytic cells for periods as long as three or four weeks, the cells themselves being operated for six hours daily and six days in the week. Periodical inspection ensures that the treatment is not overdone. Usually the finish of the process for an object is

indicated by the vigorous evolution of gas at the negative electrode. Towards the end of the process, the strength of the current is gradually reduced to fall in line with the reduced thickness of the crust and the decreased resistance offered.

When the electrolytic treatment is over, the solution is let out through a tap at the bottom of the cell or removed using an enamelled water jug. Then the image is taken out and is immediately washed under running water from a tap. A heavy greenish sludge runs off under the force of the water. This is followed by brushing with a hard bristle brush (hard nylon brushes are enough for small images) and more washing with water. It is very important that not only the liberated particles are removed but not a trace of salt is allowed to remain. Careful brushing and vigorous washing of crevices and corners has to be done to displace the last traces of salt which are likely to remain there, for otherwise they are certain to cause a fresh outbreak of a type of severe corrosion which goes by the name of "bronze disease". This type of corrosion may be seen as spots of greenish-white, dry, powdery salt here and there on an image which may be otherwise in an excellent condition. This "bronze disease", besides disfiguring the image badly, has the unfortunate tendency of spreading all over the image, once it gets started in some part. The smallest amount of salt, especially a chloride, is enough to initiate this, and that is why the most scrupulous washing is insisted upon every time. The most elaborate techniques of washing have been devised to bring about the total removal of the salts. Generally a final rinse or more with hot distilled water ensures this happy result, if it is done until testing with silver nitrate reveals the absence of chlorides.

The washing being satisfactorily over, the image is allowed to dry thoroughly. Then it is given two coatings of celluloid in a mixture of acetone and amyl acetate to protect it from exposure to corrosive influences in the air. (Fig. 147).

The result of all this treatment is indeed most pleasing. The surface of a bronze image thus restored electrolytically is smooth and free from any corrosion product. The details of ornamentation are rendered clearly visible. This method is gentler, safer, more effective and more controllable though slower and costlier than the chemical methods.

*Other Methods—Chemical and Electro-Chemical:—*But the chemical methods cannot be altogether dispensed with. There are other metallic objects which, because of their size, the state of their surfaces and the metals of which they are made, are more easily restored by chemical processes. In this class fall the innumerable coins, the several iron implements and various miscellaneous metallic objects that are sent to the laboratory for restoration. For antiques of lead, electrolytic treatment is avoided. Coins are subjected to electrolytic treatment in apparatus specially set up for the purpose, but as chemical methods have been found to be easy and effective as well, they are invariably adopted. Where the chemical method proves to be indecisive, the electro-chemical process steps in efficiently to clear the antiques of products of corrosion. The latter lies between the chemical method and the electrolytic method in principle and effectiveness.

The chemical method is based on the principle of softening and dissolving out the disfiguring crust through suitable solvents. Thus here the offending crust is removed bodily—it is not reduced, decomposed and then rubbed off as in the electrolytic method. On the other hand, the electro-chemical method adopts the principle of reducing the crust of corrosion products as in the electrolytic method but relies solely on chemical action to bring this about. Either zinc granules or aluminium turnings in contact with an acid or alkali evolve hydrogen which at the moment of its evolution is tremendously effective and reduces the products of corrosion back to the metal.

Whereas the operation of the electrolytic method is the same whatever the metal of which the object under treatment is made, the chemical—and to an extent the electrochemical method—varies from metal to metal, even from object to object.

This is so because each metal forms a crust of characteristic compounds which can be dissolved out only by specific solvents. There is no single chemical that will have a uniform effect on them. Even the same metal is corroded differently depending on the influences to which it had been subjected—whether it lay under salt-laden earth or had been exposed to an atmosphere full of sulphurous fumes or moisture. Indeed antiquities of the same material have been found in a variety of corroded conditions. One comes upon copper coins all lumped up together and all covered with a thick greenish salt that, totally obscures

the details; silver is either tarnished black, due to formation of silver sulphide or puts on a coat of pale lilac silver chloride that sometimes forms into a thick, horny layer. Lead suffers decay of an extreme nature—objects of lead succumb to the influence of carbon-dioxide and moisture in the air to form basic lead carbonate, a white powdery substance which drops off exposing fresh lead surface and leading to further formation of the same salt. Thus unless protected properly, lead objects decay fast and swell and crumble away to nothingness. Even gold, which by itself is immune to corrosion, may get coated with copper salts due to contact with copper containers or objects or get covered with calcareous and siliceous crusts.

Chemical treatment for copper:—When copper that is covered with greenish chloride is soaked in a solution of Rochelle salt (15%) and caustic soda (5%) in water and brushed and washed at regular intervals, the crust of the copper salt is dissolved away and the finer details underneath brought to light. It may be that even after the removal of the chloride layer, there may be beneath it a reddish coating of cuprous oxide. In this case, the above solution mixed with hydrogen peroxide (H_2O_2) to the extent of 10% is used; hydrogen peroxide oxidises the cuprous compound to the cupric one and the alkaline Rochelle salt solution dissolves away the oxidised product.

Lead:—For objects of lead degenerating into white basic lead carbonate, the proper chemicals to be used are dilute acetic acid solution (5%) and dilute sodium hydroxide solution alternately in this order, acetic acid to remove the basic lead carbonate and alkali to remove the acetic acid which, if left on the metal even in traces, causes decay to occur once again. A safer and quicker method recently adopted is the removal of the undesirable crusts through the use of ion-exchange resins. Amberlite IR-120, an ion-exchange resin recommended by H. J. Plenderleith, has been found to be suitable for this purpose. In this method the object is surrounded with the resin soaked in distilled water and kept thus for a few hours. When removed thence after a suitable interval and brushed, the unwanted crust goes off leaving behind the metallic core and revealing all the extant details.

Silver:—The cleaning of silver presents problems no less keen than that of copper or lead though silver, which nearly qualifies to be a noble metal, is expected to undergo less decay.

The decay undergone is not, of course, much but what does occur, occurs so continuously and forms such a thick, non-porous layer which adheres closely to the surface of the metal that it is difficult to dislodge it. Silver gradually tarnishes in the air or forms black disfiguring patches of silver sulphide due to the presence of sulphur compounds in the air or under the earth (Fig. 148); when chloride is present, it also forms silver chloride as a thicker and harder crust. Stained with impurities or discoloured by itself, this crust is as unsightly as the other one. Contact with copper or the preferential decay of the copper that is generally alloyed with silver also results in the formation of thick ugly crusts of copper compounds which sometimes spread so thoroughly over the coin or the object as to obliterate all signs of silver and make one believe that it is made of copper only.

In the case of the formation of silver sulphide or silver chloride crusts, the object is treated with hot formic acid (10%) followed by ammonia solution, if necessary after thorough brushing between the soakings. If the crusts do not respond to this treatment and do not soften up, then they have to be rubbed off through vigorous brushing with silversmith's rouge. If they persist even after this, then the object has to be treated electrochemically with a solution of sodium carbonate (10%) and aluminium turnings. Repetitions of these various processes may be necessary, and no hard and fast sequence of them can be laid down which will answer all purposes; every silver object has to be treated differently on its individual merits.

Where copper salts occur as patches on silver objects or coins, they are best removed by ammonia solution (20%) or alkaline Rochelle salt solution. After their removal, the details of the silver object may have to be won back from the silver salts disfiguring its surface through the methods given above. The cleaning of silver is a slow process, but is thorough (Fig. 149).

Gold:—Gold presents almost no problem at all in chemical conservation. It is practically unaffected by any corrosive agent. The utmost that may happen to it is to be covered over with siliceous material or be coated with a layer of copper products possibly from the copper vessel that contained it or copper objects in its vicinity. In the first case, soaking for a time in 5% Lissapol solution followed by vigorous brushing is enough to bring out the details; in the second, alkaline Rochelle salt

solution is invariably the solvent most effective in clearing away the copper compounds and revealing the underlying workmanship. A large number of gold coins have been treated in the laboratory and restored to a fine condition.

The aftercare of metallic antiquities:—However, the care of these metallic antiquities does not end with the removal of the undesirable incrustations. It is necessary that such formations are made impossible in time to come. The simplest method to bring this about is to give the object a suitable protective coating that would shield its surface from the atmosphere and all the corrosive substances that it contains. Before applying the protective coating, it is no less essential that the object is thoroughly dried; no moisture in any case should be trapped by the protective coating, for then that will carry on its nefarious work undetected for a long time. The selection of the wax or resin or the plastic for the protective coating is also limited by factors such as the transparency of the substance, its stability, its non-permeability to moisture and gases and the absence of any chemical reaction with the metal. Celluloid dissolved in a mixture of acetone and amyl acetate has proved to be a reliable material for copper, bronze, iron, silver and gold. For lead necessarily and iron preferably, paraffin wax is most suitable.

Conservation of antiquities of other materials:—Apart from metallic objects, antiquities of other materials have also been time and again conserved by treatment in the laboratory. These materials may be broadly divided into two classes—organic and inorganic. The first group comprise of objects made of leather, ivory, bone, textiles, paper, wood etc.; the second those of stone, marble, clay, glass, etc.

Organic Materials:—Organic materials, being by nature easily susceptible to decay, demand more careful attention. They succumb not only to the influence of moisture and gases but also to the attack of the numerous bacteria and minute organisms floating in the air and the several insects which flourish especially in a tropical climate like ours. Even if such influences are effectively controlled, the materials may deteriorate due to structural changes or rather, what the chemists call, chemical decomposition. As the chances of decay are larger, the care to be exercised against it is to be no less great.

One of the organic materials to be effectively treated in the Laboratory is the leather on the former State Coach of the

Governors of Madras. It is a splendid vehicle and a fascinating historical piece. But due to neglect perhaps, the leather parts on it were dry and brittle—a condition in which the material is apt to decay and lose its flexibility and beauty. Mould also formed on it frequently. To give it back its flexibility and ensure its permanance, the leather was given a coating of the British Museum Leather Dressing in 1955 and of castor oil in rectified spirits (10%) in 1959. To prevent the formation of moulds, a very small quantity of p-Nitrophenol (0.4%) was added to the solution.

Wooden panels belong to another class of organic materials that have been cleaned in large numbers. The chief defect with the panels received was that they were covered with tarry matter ostensibly coated as a protective material. This blackened their surfaces and hid the details of the fine carvings. All that is necessary to soften the tarry matter and facilitate its being removed is to pour boiling sodium carbonate (5%) solution over the panel or dip the smaller-size panels in such a boiling solution for about half an hour. After being softened, the tarry matter is scraped off, taking care not to scratch the surface of the carving. After all tarry matter is carefully scraped off, the wooden panel is allowed to dry slowly in the shade. Gradual drying is necessary to prevent the warping of wood. When the panel is dry, it is coated with hot molten paraffin wax, twice over if necessary, to give the wood sufficient protection.

Inorganic Materials :— Siliceous materials present an altogether simpler problem in conservation. In contrast to organic materials, they are of a more enduring nature and some of the finer specimens of rock surpass even metals in resisting corrosion. The siliceous materials that were generally used in antiquity were granite and marble, minerals like cornelian and opal and clay for pottery.

If stone objects suffer damage on their surface, it is because of the inclusion of soluble salt in the pores of the surface. The soluble salt absorbs moisture from the atmosphere, and forms a solution, and the solution is drawn into the far interior of the pores and interstices when atmospheric conditions are moist. When drier conditions return the solution evaporates, the salts crystalize out and as they crystalize out, their force is enough to break up the surface in the immediate vicinity. Constant recurrence of this results in the surface peeling off. If this goes on for a long time, the sculptured details get blurred and

disappear, and the stone becomes rough and porous. All its smoothness and gloss disappear. The remedy in all these cases is to get the soluble salts out. An ingenious method has been devised to draw the salts out. This consists of covering the entire surface of the object with a fine pulp made of blotting paper in distilled water, and allowing it to be there for two or three weeks. What happens is that the water from the blotting paper first enters the pores in the stone and dissolves out the salt. Then as evaporation sets in, the solution inside the paper is drawn out by the drying pulp. A second application and a third too might be necessary depending on the extent of the damage to the surface.

Amaravathi marble friezes, which had been treated this way, have been found to keep well for a long time. A final coating of 2% celluloid solution helps to keep the surface from crumbling to powder. A solution of freshly-prepared Chloramine-T or of hydrogen peroxide and ammonia (all about 5% strength) is used to remove any stains. For removing stains of a greasy nature, benzene or methylated spirit is used.

Paintings:—From the point of view of conservation, paintings form a class by themselves. They demand even greater attention than antiquities of metals or organic materials, and their treatment is based on individual considerations. The problems they pose in restoration are infinite and every one of them has to be resolved with as much care and delicacy as can be expended, for here there is no question of a strong inner core as in metals to withstand inadvertent rough treatment.

Paintings fall into different categories—those drawn on walls going by the name of murals, those made on canvas or wooden panels, those done with water colours or oil pigments. Each of them demands a different approach in preservative treatment. In all cases, it is essential to have a knowledge of the painter's technique before conservation is undertaken.

The Chemical Conservation Section of the Madras Museum has the distinction of having pioneered the restoration of wall paintings at Sittannavasal and investigated the techniques of ancient Indian paintings in general. In 1935, the Archaeological Survey of India became alive to the problem of examining the conditions of the Ajanta-like paintings in the Brihadisvara temple at Tanjore and preserving the paintings at Sittannavasal

in the Pudukkottai State. The then Director-General of Archaeology, Mr. J. F. Blackiston, requested Dr. Gravely to spare the services of the Archaeological Chemist of the Madras Museum for this work. Having realised the importance and the urgency of the work, Dr. Gravely immediately acceded to the request. Dr. Paramasivan, who was then the Archaeological Chemist, undertook the work of studying the technique of the painters of old and restoring such as were required.

Sittannavasal is a village in Pudukkottai. Not far from it, in a cave temple, belonging to the 7th century A.D., there are exquisite paintings on the walls, which had, however, deteriorated due to neglect and even abuse. These are the paintings which were preserved and restored scientifically by Dr. Paramasivan. Before restoring them, Dr. Paramasivan undertook a thorough study of the technique used in the paintings and of the causes and nature of their decay to provide a scientific basis for his subsequent work.

Indeed these paintings, he found, had been exposed to a variety of adverse conditions—elemental, human and otherwise. Whereas in the Ajanta and Ellora Caves, the snag is that there is too little of light and air to protect the paintings from damp and organic growth, here there has been too much of both. The paintings are found on walls which are open to the sky, and the sun beats down upon them regularly, resulting in drying up of the paint surface and the cracking up of the layers underneath. Wind blows directly upon them bringing with it an abundance of dust and settling it on the paintings. Rain water flows down upon them and dampens them, and in humid weather, mould forms and has left its marks on the surface. Birds and beasts leave their droppings and insects build their cocoons on the paintings, and men, not to be outdone used to come as travellers and light up fires nearby causing soot and oil to settle upon them. When the census men visited the temple, they found the very body of the paintings most appropriate for making their official marks upon, and artists, who traced them, had left their quota of tracing paper, gum and glue upon the walls.

These causes of damage were all external to the paintings. There were others rooted in their very make-up, such as poor mixing of pigments, bad preparation of the plaster, too fine and polished a ground for the paintings. The totality of these causes led to such a bad disfigurement and damage in places, and

effacement of details that it demanded an imaginative approach to win them back from all these ravages.

All that was done with the utmost care and delicacy and simplicity too. The wasp nests and insect cocoons were gently tapped out with fingers or pieces of wood, or disengaged from their positions with suitable solvents or soap. Wax was either scraped off with a hot blade or removed with a mixture of toluene and xylene. Compressed air was used carefully to blow off the dust and dirt and soot, and where these still clung tenaciously to the painting, a little of soap and ethyl acetate mixture helped to loosen their hold and displace them. An acetone-and-ether mixture did away with the tar marks left by the census staff. After other such extraneous damage was set right, the plaster of the painting was fixed and strengthened with lime casein and vinyl acetate. The result of this treatment was that much more of the painting could be seen than before, and the paintings are in a better state.

Work other than restoration:—This work of restoration and conservation of materials brought to the museum is a large slice but still only a slice of the work done at the Chemical Conservation Section. Research in techniques of restoration as well as in the composition and the making of materials of old had also been a prominent feature of its work. In fact a great deal of work in investigating the techniques used by the ancient painters at Ajanta, Ellora, Bagh, Tanjore, etc. had been done in the section and several papers incorporating the results published in such leading journals as "Nature", "Technical Studies", "Journal of the Madras University", "Proceedings of the Indian Academy of Sciences", "Current Science" etc.,. These papers together form a valuable thesis on the wall paintings of India.

But research work has not been confined to paintings alone. Analyses of alloys from metallic antiquities were done, radiographs of images were taken, metallographic studies were carried out—all in an attempt to piece together the techniques of the ancients in making metallic objects—be they images or coins. Analyses of blue glass beads from Arikamedu were made, and a note on it was published in "Current Science" in January, 1950.

Moreover newer methods for making electric moulds with the help of latex or *gracilaria lichenoides* were experimented

with. Even in restorative work, new methods and new chemicals have been always used whenever they were strikingly effective.

Year after year, since a few years past, batches of school teachers as well as small groups of students of museology have been given training in methods of chemical preservation and restoration.

The section has come a long way from its small beginnings in 1931, from the time when it was housed in a building meant for another purpose and did its work through purely chemical methods. Even in the day-to-day routine of the Museum, it has found itself to be an integral and inseparable part.

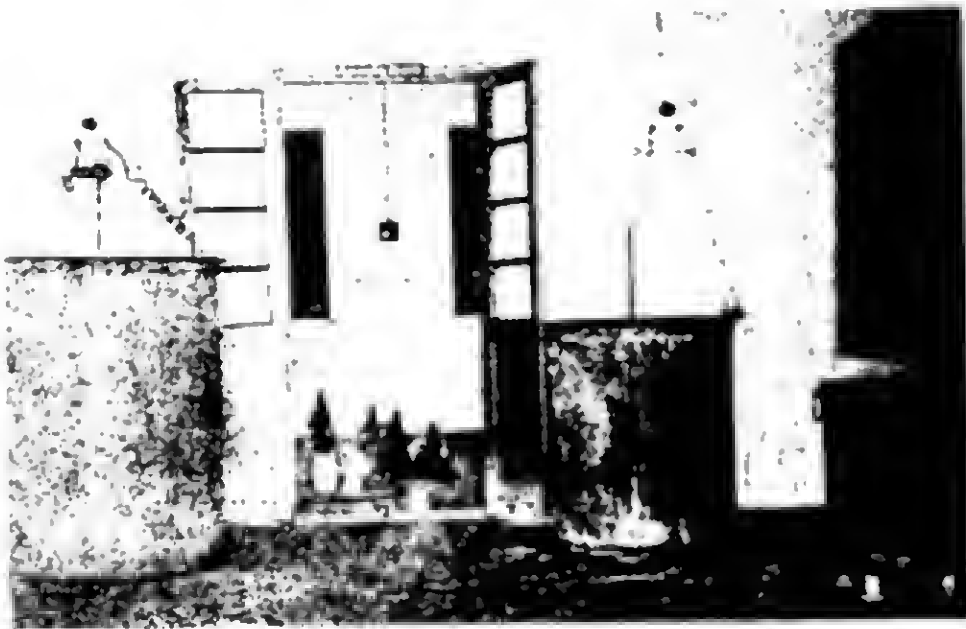


FIG. 144. THE ELECTROLYTIC CELLS IN THE CHEMICAL
CONSERVATION LABORATORY

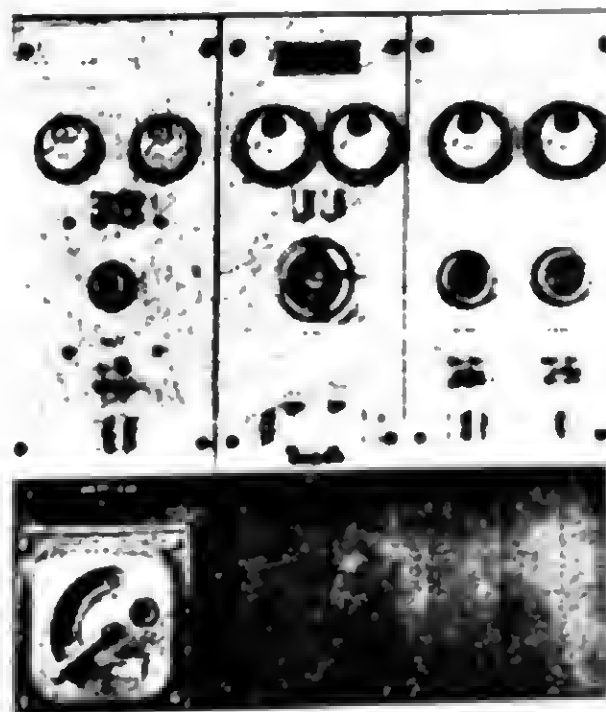


Fig. 145. THE PANEL FOR REGULATING
CURRENT TO THE ELECTROLYTIC CELLS

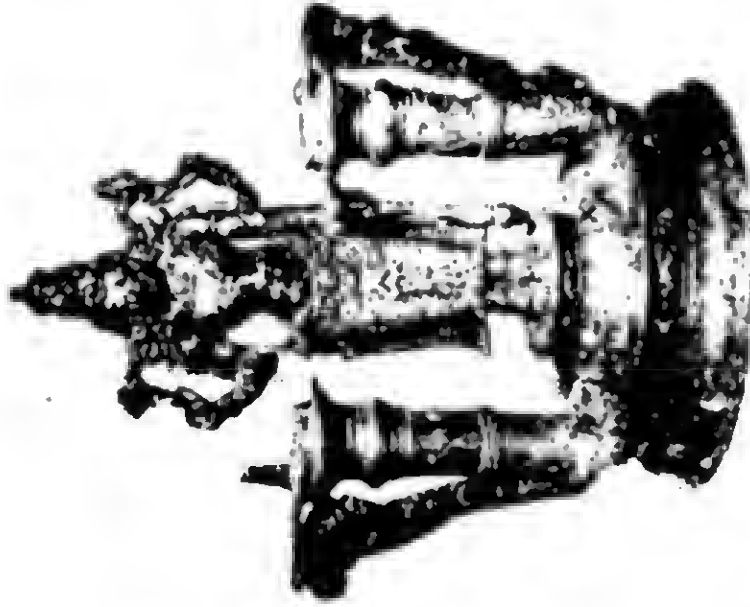


Fig. 147. BRONZE AFTER TREATMENT

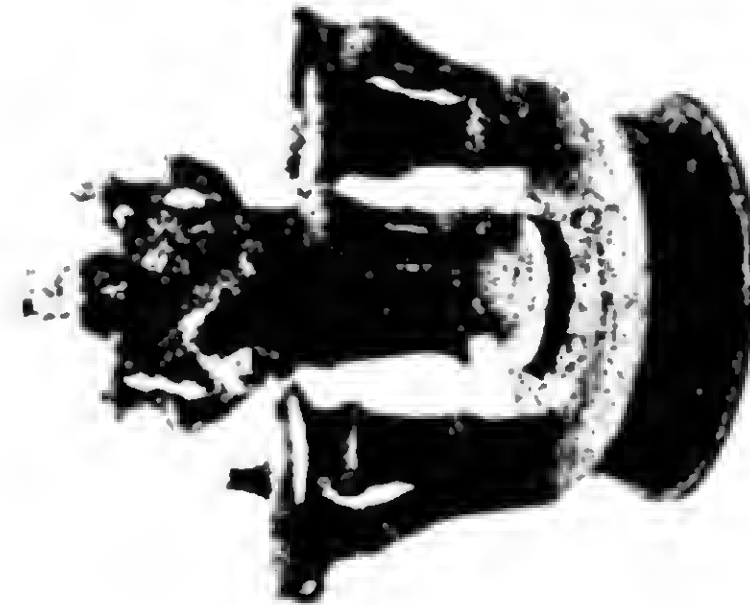


Fig. 146. BRONZE BEFORE TREATMENT

PLATE CIII

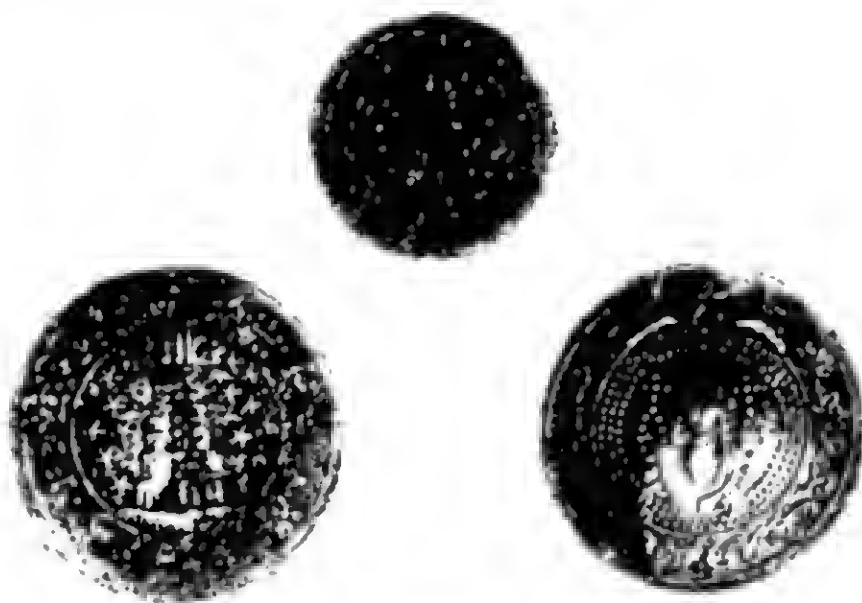


Fig. 148. SILVER COINS BEFORE TREATMENT



Fig. 149. SILVER COINS AFTER TREATMENT

CHILDREN'S SECTION

BY

S. T. SATYAMURTI, M.A., D.Sc., F.Z.S.

(Superintendent, Government Museum, Madras)

One of the recent developments in the sphere of Museum activity, especially in the western countries, is the organisation of special museums and galleries that would cater exclusively to the needs of children. In the United States of America such "Children's Museums" have become increasingly popular in recent years, a large number of them having sprung up all over the country within the last decade or two. Such museums serve as lively centres of educational activity for children of all age groups, apart from being show places for housing selected exhibits planned specially for children. Opportunities for handling the actual objects and for creative activities such as painting, model-making and other hobbies are provided, and the whole panorama of life is made more real to the children through special displays, film shows, lantern lectures, demonstrations, dramatic performances and other cultural activities.

In India, unfortunately, very little progress has been made in this direction so far. The Madras Museum, which has to its credit an enviable record of educational services, has been planning to set up a Children's section for the past few years, and in October, 1956, during the International Museum Week, the foundation stone was laid for a separate block for the Children's Museum in the Museum compound, by His Excellency Shri Sri Prakasa, who was then the Governor of Madras. However, owing to financial stringency the implementation of the scheme had to be deferred, but a beginning has been made in collecting a number of specimens, models and other exhibits of special interest to children, to form a nucleus for the proposed Children's gallery.

At present, the collection includes, among others, a series of life-like models (reduced to scale) of a selection of sixteen extinct animals that dominated this earth in the past geological ages (Figs. 150 and 151). These are exhibited in the form of suitable dioramas, so as to present them as far as possible in their natural

settings with the contemporary vegetation painted in the background. A series of attractive enlarged models illustrating the internal structure of the earthworm, fish, frog (Fig. 152), garden lizard, pigeon and rabbit, a working model illustrating the circulation of blood in the human body (Fig. 153) and enlarged, dissectable models of the human heart and the human eye, have also been exhibited with adequate labels so as to make some of the basic lessons in animal and human biology vivid to the children.

Another group of exhibits which is expected to arouse the interest of children, especially of the lower age groups, in peoples of foreign lands, is a set of twenty nine dolls of different sizes, dressed in the national costumes of Yugoslavia (Fig. 154). These were presented by the Yugoslav cultural mission which visited the museum in 1953. A number of interesting objects of everyday use belonging to American Indians, including a pair of beautiful moccasins of exquisite workmanship and a two piece dress worn by the American Indian children also form part of our material collected from foreign countries specially for exhibition in the Children's section.

A set of thirteen dolls dressed in costumes characteristic of the different parts of India and Ceylon have also been recently acquired to illustrate vividly the sartorial habits of the people of the different States in the country (Fig. 155). Another attractive exhibit recently added, is a series of dolls illustrating the various classical dances of India, namely, Bharatha Natyam, Kathakali, Kathak and Manipuri.

A science section, especially one that is equipped with working models, is an indispensable part of a modern Children's gallery. With a view to fulfilling this need, a number of scientific exhibits have been acquired to start with. These include a series of specimens and photographs illustrating the story of glass in its varied forms, its manufacture and multifarious uses, the Spitz Junior Planetarium, capable of projecting a realistic image of the starry skies in a darkened room, a working model of an internal combustion engine, and two globes, worked by electricity, one illuminated by an internal electric bulb and the other a rotating one, with a model of a man-made satellite revolving round the globe, the relative speeds of the motions of the earth and the satellite being accurately depicted in this working model. A few scale models of well known foreign ships (Fig. 156) and native

craft of India which are also available at present in the collection of the Children's section are exhibited as part of a series illustrating the evolution of human transport, along with working models of locomotives, aeroplanes and other means of transport both primitive and modern.

Although this small collection of exhibits, as it stands at present, may appear to be a somewhat random assortment of miscellaneous objects, it would be possible to fit them into well planned and intelligible series, so as to tell connected stories illustrating specific themes in History, Ethnology, Biology and the Physical Sciences, which would appeal to children, as further material is gradually added. The proposed Children's section is a new venture, and is still only in its formative stage, but it holds out a great promise for the future and it is hoped in course of time this will form one of the liveliest and most attractive sections of this Museum.

The Children's Gallery is at present provisionally accommodated in the mezzanine floor of the new Natural History Block, but eventually it will be shifted to the separate Children's Museum building which is expected to be constructed in the near future.



Fig. 10. THE MINERAL MORAHA



Fig. 151. *ELEPHAS PRIMIGENIUS* THE MAMMOTH



Fig. 152. MODEL OF A DISSECTED FROG

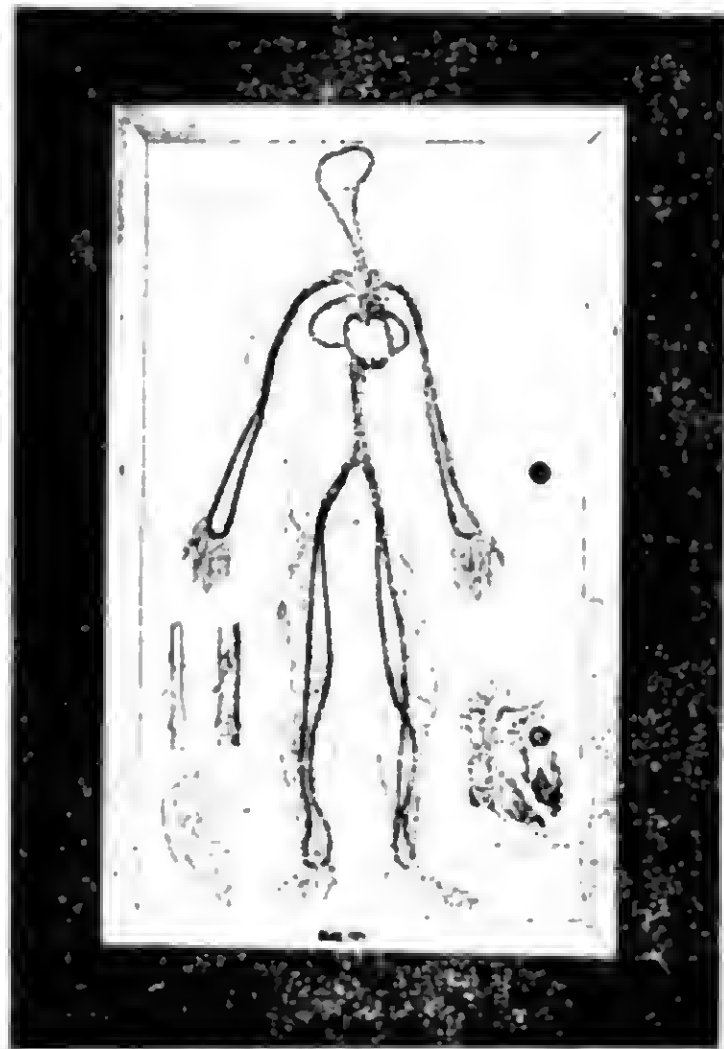


FIG. 153. MODEL ILLUSTRATING THE CIRCULATION
OF BLOOD IN THE HUMAN BODY

PLATE CVIII



Fig. 154. NATIONAL COSTUMES OF YUGOSLAVIA



Fig. 155. COSTUMES OF INDIA

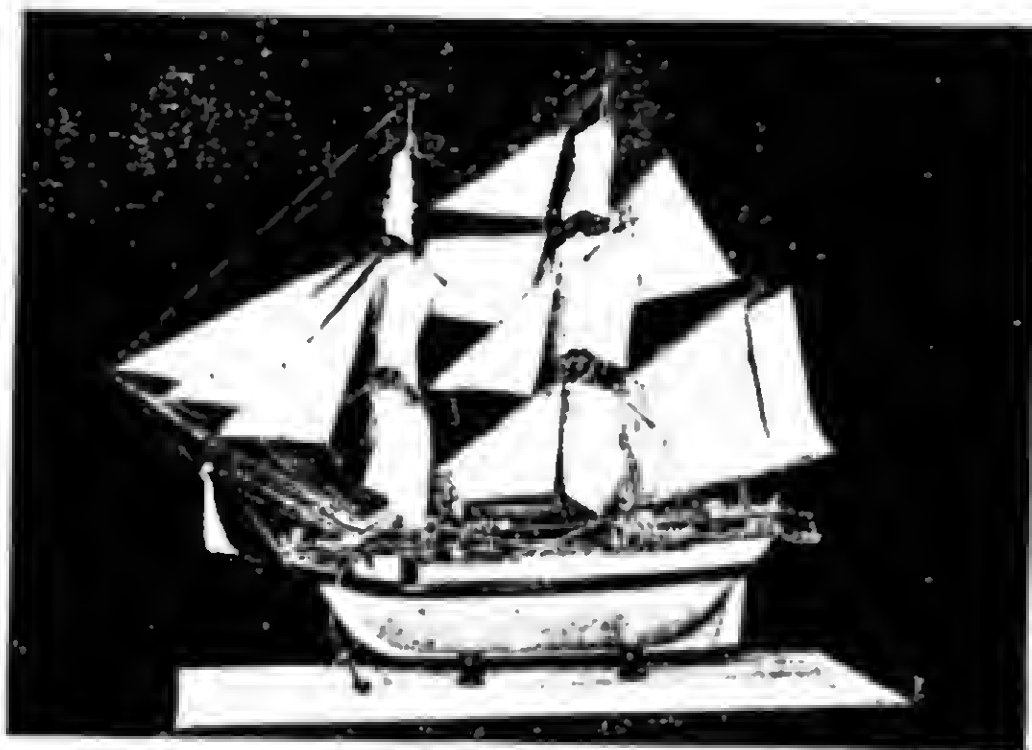


FIG. 156. MINIATURE MODEL OF A FULLY RIGGED SAILING SHIP:
PRIVATEER FLAME.

RESEARCH AND PUBLICATIONS

BY

C. J. JAYADEV, M. A., L. T.

(Assistant Superintendent (Retired) Government Museum, Madras)

ZOOLOGY

Fortunately, the Madras Museum, ever since its beginnings, has had a succession of able Superintendents who were keenly interested in Zoology and contributed greatly to the enrichment of its zoological collections. In 1885, when Dr. Edgar Thurston took over as Superintendent the scope of the collections began to be limited to Madras Presidency. Dr. Thurston paid special attention to the marine fauna of the Madras Coast and did much to enrich the marine collections of the Museum. One of the earliest bulletins of this Museum in the Natural History Series is on the fauna of the Rameswaram Island by Dr. Thurston. He also worked on the amphibians of Southern India and published his results in a bulletin entitled "The Batrachians of Southern India" in the old series.

Dr. Henderson, who succeeded Dr. Thurston, as Superintendent, was himself a biologist and introduced the idea of displaying animals in their natural setting in the form of small habitat groups in the zoological galleries.

He was succeeded by Dr. Gravely to whom the Madras Museum owes much of its present high standard and status as a scientific institution. He worked hard in enriching and thoroughly reorganizing the zoological collections and was able to build up and arrange the zoological galleries on a scientific basis. The Coral and Invertebrate galleries as they stand today are mainly the result of his labours and he also built up a useful reserve collection of zoological specimens for the use of students, and research workers. Under his able guidance and initiative, intensive systematic work was undertaken on the marine fauna of Krusadai Island in the Gulf of Manaar and a series of useful papers on faunistic surveys have been published as Museum Bulletins in the Natural History series, both on the fauna of Krusadai Island and its vicinity and on the marine fauna of the Madras Coast. The list of publications of this Museum, in the Natural History series, appended below, will serve to give the

reader an idea of the range and extent of the research work carried on in the Zoological section of this Museum.

The main type of zoological work done in this Museum has been of the systematic type and the marine fauna of Madras Coast and of Krusadai Island have formed the chief subjects of zoological study in this Museum. Several papers on the Decapod larvae of of the Madras Coast have been published by research scholars of the Madras University as Bulletins of this Museum. Dr. Gravely worked on several groups of marine invertebrates in Krusadai Island and published his results in the paper entitled "The Littoral Fauna of Krusadai Island in the Gulf of Manaar" which includes contributions from other authors and which still remains the main standard work of reference for students who visit the Island on collecting tours. Several supplements to this volume on various other groups have also been subsequently published.

More recently a series of useful studies on the marine fauna of Madras Coast have been published as Bulletins of this Museum by research scholars of the Madras University Zoology Department. These include "The Thaliacea of the Madras Plankton" by Mr. R. Velappan Nair "The Cirripedia of the Madras Coast" by Dr. A. Daniel and "The Amphipoda of the Madras Coast" by Mr. N. Nagappan Nair.

During recent years the Molluscan fauna of Krusadai Island was systematically studied by Dr. S. T. Satyamurti, the present Superintendent, and his results have been published in two monographic volumes as bulletins of this Museum. Another detailed paper on the Land and Freshwater Molluscan collections of this Museum has also been prepared by the same author and this has been recently published as a Museum Bulletin.

Studies on South Indian Lepidoptera and South Indian Ambhibia were also undertaken by him and the results are being published as Bulletins of this Museum in the Natural History Series.

BOTANY

A systematic survey of the flowering plants growing in and around Madras city, was carried out in detail. A newer, cheaper and more efficient method of preserving green botanical specimens with colour, was worked out. Preservation and display of plant seeds and dry fruits in their original colours, were also successfully worked out. Possibilities of cultivating in Madras the

Jabra plant (*Bixa orellana*) of the old Agency tracts of the Vizagapatam District, and new species of *Eucalyptus* from Australia, were explored, the former quite successfully and the latter with rather indifferent results. Experiments in collaboration with the Industrial Section of the Indian Museum, Calcutta, were made to cultivate in Madras, the South American Milk tree (*Brosimum galactodendron*), and the South American Chinchweed (*Pectis papposa*). The cultivation of the latter plant was profoundly successful, but the same cannot be said of the former. The so-called Anti-Malaria grass (*Melinis minutiflora*) was raised from seeds that were obtained from Assam, and its insect-repelling properties were closely studied, and found to be rather over-rated. A novel method of destruction of weeds on tops of buildings was experimentally tried with complete success. The method is, however, to be perfected still on account of its attendant dangers. A survey of the ferns growing in and around Madras City, has been carried out, and the materials gathered are now under study.

Our contributions to Botany in the form of publications are of no small interest. "The Indian species of the genus *Caralluma* (Fam. Asclepiadaceae)" by Dr. F. H. Gravely and Mr. P. V. Mayuranathan and "The Flowering Plants of the Madras City and its Immediate Neighbourhood" by Mr. P. V. Mayuranathan, are publications of a high order. The latter publication was soon followed by a supplement by Prof. E. Barnes. Other publications in recent years are those of Mr. M. S. Chandrasekhar, some of them including (1) An unusual Inflorescence of *Moringa oleifera*, Lamk. (*Journal of the Bombay Natural History Society*, 1952-53), (2) Functions of a Herbarium (*Madras Information*, Vol. VIII, 1954); (3) The Mangroves (*Madras Information*, Vol. X, 1956); (4) Green Colour Preservation of Plants (*Journal of the Madras University*, B, Vol. XXVIII, 1958); (5) Museums in Schools (*The South Indian Teacher*, Vol. XXXI 1958); (6) The Use of Local Flora in Developing Biological courses (*Vigyan Shikshak*, Vol. II, 1958); (7) Value of Museums in Secondary Education (*The South Indian Teacher*, Vol. XXXI, 1958); and (8) Plant Life—Collection and Preservation (*Handbook of Museum Technique*, Madras Government Museum, 1960).

NUMISMATICS

This Section affords facilities for the study of coins to scholars, Indian and foreign. The Punch-marked coin, the

earliest coins of India in the collection, were studied in great detail by Mr. Parameshwari Lal Gupta and Miss R. Vanaja, during the years 1953-55. A thesis entitled "The Madras Museum Collection of Silver Punch-marked Coins" embodying the results of her work has been brought out by the latter.

The coin collection has been steadily increasing since a start was made a hundred years ago and former Superintendents and Curators of this Section studied them and published them. Dr. G. Bidie brought out a catalogue of gold coins in the Government Central Museum and in 1883 published his famous article "On the Pagoda or Varaha Coins of South India" in the "Journal of the Asiatic Society of Bengal." This article continues to be of interest even to-day. Dr. E. Thruston, Superintendent of the Museum, brought out many publications on coins. He catalogued the coins of Mysore, Roman, Indo-Portugese, Ceylon coins, coins of the Sultans of Delhi and coins of the English East India Company. His book "The History of the Coinage of the Territories of the East India Company in the Indian Peninsula and Catalogue of the coins in the Madras Museum," remains the only standard book for reference on this particular subject. Dr. J. R. Henderson, Superintendent of the Museum during the years 1908-1917, himself catalogued and published "The coins of Haider Ali and Tipu Sultan." A comprehensive catalogue of the Venetian coins in the collection was published by Mr. T. G. Aravamudhan, a former Curator of this Section. Prof. M. Rama Rao of Hyderabad studied the Satavahana coins in our collection and brought a monograph on "Select Satavahana coins in the Government Museum, Madras. A small booklet, "Coins of India through the ages" and an article "On coinage and preservation of coins" (in the "Hand-book of Museum Technique") have been published by Mr. P. N. Mohandas, Assistant Superintendent of this Museum, who is now in charge of this Section.

Shortly to be published are Prof. T. Balakrishnan Nair's work on Eastern Chalukyan and Chola coins of the Dowleshwaram hoard, Mr. T. G. Aravamudhan's "Catalogue of Roman and Byzantine coins in the Madras Museum and Prof. Azamathulla's "Catalogue of Arab coins in the Museum."

ARCHAEOLOGY

As early as 1902, it was decided that all copper plate grants, deposited in the district offices of the Presidency, should be transferred to the Madras Museum. 190 copper plates were thus

received and the number was increased by gifts, purchase, etc., by the end of August 1917. A catalogue of the copper plates, containing a short description of each of the grants, prepared by Mr. R. Srinivasa Raghava Aiyangar, the then Archaeological Assistant, was published in the year 1918. This marked the beginning of an era of intense research and publications of the archaeological section.

In 1926 portions of a stupa were dug out from a small mound in a field adjoining the village of Goli in Guntur District, by Dr. G. Jouveau Dubreuil of Pondicherry. Most of the sculptures were transferred to this museum, with his help. A monograph on these sculptures by Mr. T. N. Ramachandran appeared as a bulletin of the Museum in 1929.

The Madras Museum gathered under a single roof the world's largest collection of South Indian metal images, mostly acquired by Government from treasure trove finds. Some were thus acquired as long ago as 1872. With a view to bring to public notice, the whole of the Madras Museum collections, a Catalogue of the Hindu Metal images was prepared by Dr. F. H. Gravely and Mr. T. N. Ramachandran, which was published in 1932. Immediately after this, Mr. T. N. Ramachandran took up the preparation of a treatise on Tirupparuttikunram and its temples. Tirupparuttikunram is a village on the outskirts of Conjeevaram, containing two Jaina temples. The smaller of them is in the late Pallava style, while the larger is in early Chola style with a Mandapa in Vijayanagar style. The work was published in 1934 with appendices on Jaina units of measurement of time, cosmology and classification of souls. Dr. F. H. Gravely, and Mr. T. N. Ramachandran published a bulletin on three main styles of temple architecture recognised by the silpa sastras in the same year. Two years later 'An outline of Indian temple architecture' was published by Dr. F. H. Gravely.

'A Guide to the Archaeological galleries' in the form of an introduction to South Indian temple architecture and sculpture appeared in 1939. This was followed by the publication in the same year of a companion volume to the above, under the title of 'Illustrations of Indian Sculpture, mostly Southern.' Both the above guide books were prepared by Dr. F. H. Gravely and Mr. C. Sivaramamurti.

Mr. C. Sivaramamurti prepared three exhaustive and illustrated monographs, namely, (a) Indian epigraphy and South Indian

scripts (b) Amaravati sculpture in the Madras Government Museum and (c) The Early Eastern Chalukyan Sculpture. The paper on the Amaravati sculptures is much more than a descriptive catalogue of the sculptures. Such antiquities can only be rightly understood, when viewed against the background of the culture from which they sprang. A general account of the history of the Satavahana Kingdom, of the formation of different schools of Buddhism, and of the nature and origin of Stupas as well as the four distinct periods that have to be recognised in Amaravati sculptures are discussed in the most striking manner. An artist by himself, Mr. Sivaramamurthi has illustrated most effectively, the Indian dress, furniture, etc. 'Indian Epigraphy and South Indian scripts' is a unique book of its kind, which has been well received and appreciated by scholars.

Buddhist bronzes, though rare in South India, are occasionally found mostly in Tanjore District, dating from 11th to 15th century A. D. from Nagapattinam. Since 1856, about 350 Buddhist bronzes of the Mahayana school, were recovered from the vihara sites, raised by the Sailendras of Sumatra, in the time of the Chola kings, Raja Raja I and Rajendra I. A monograph on these bronzes was prepared by Mr. T. N. Ramachandran and published as a bulletin of the Madras Museum in 1954:

A guide to Buddhist antiquities was prepared by Dr. A. Aiyappan and Mr. P. R. Srinivasan in 1952 on the same lines as the handy guide to the archaeological galleries. During the celebrations of the 2500th Buddha Jayanthi at this Museum a treatise entitled, 'The story of Buddhism with special reference to South India' by Dr. A. Aiyappan and Mr. P. R. Srinivasan was published in 1960.

A monograph entitled 'The beginnings of the traditions of South Indian temple architecture' by Mr. P. R. Srinivasan was published in 1960.

A comprehensive monograph on the "Bronzes of South India" with profuse illustrations by the same author was published and released on the occasion of the opening of the new Bronze Gallery in 1963. A catalogue of Jain stone sculptures and bronzes, also by the same author, is under preparation.

The high standing and immense popularity of the series of publications during the past fifty years may be seen from the

fact that most of the bulletins have run out of print within a few years of their publication and a number of them have gone through their second editions. The Guide to the Archaeological galleries have so far gone through five editions. It is matter of legitimate pride, that the archaeological section of this museum has been able to devote considerable attention towards research and publication and has been able to bring out a series of publications that have maintained their excellent literary traditions and high international standards and are in constant demand by orientalists, scholars and Indologists the world over.

To these research publications of the Museum may now be added the Transactions of the Archaeological Society of South India, the only institution of its kind in India which is sponsored by this Museum and the Government of Madras and as such its Transactions, now in the fourth year of issue, find a place on the international mailing list of this museum.

ANTHROPOLOGY

This Museum was one of the earliest centres of anthropological research in India. Mr. Robert Bruce Foote, the father of Indian prehistory discovered in 1863 at Pallavaram, Attirampakkam and other places around Madras, some of earliest palaeoliths. Some of these earliest implements are among the most important exhibits in the Prehistory Galleries. "The primitive Tribes and Monuments of the Nilagiris" by Mr. J. W. Breeks was published in 1873 and the collections of pottery, beads, ornaments and iron tools excavated by him found their way into this Museum in 1878. At the same time the head of the Museum, Dr. G. Bidie, made Ethnology a museum subject to be illustrated by ethnographic collections and prehistoric antiquities. From this period onwards there was continuous research both in Ethnology and Prehistory.

Prehistory:— In addition to the Breek's collection, Mr. R. B. Foote brought together and catalogued the collections of Mr. R. B. Branfill from Mysore, Mr. Stoney from Coimbatore Mr. C. Cardew from Anantapur, Mr. F. Fawcett from Malabar, Mr. H. R. P. Carter from North Arcot and Foote's own earlier collections from Chingleput in 1901. These constituted the first exhibits in the Pre-historic Antiquities galleries of this museum. The next two publications, 'The Foote collection of Indian prehistoric and protohistoric Antiquities: Catalogue Raisonne' (1914) and 'Notes on their Ages and Distribution' (1916) describe

one of the world's largest collections of prehistoric antiquities. It is to the credit of the Government of Madras that this collection which was made by Mr. R. B. Foote as his life time hobby was acquired and housed in this Museum at a cost Rs. 40,000 in 1904. Since then, this Museum has been the research centre for prehistory in India affording facilities for scholars in India and from abroad. This collection covers the entire Peninsula of India and has been added to from time to time by fresh additions. Excavated materials from the megalithic sites in South India found their way into this museum and were catalogued by Mr. A. Rea as 'Prehistoric Antiquities from Adichanallur and Perumbair' (1914). The skeletal material associated with Adichanallur was studied by Sir Grafton Elliot Smith and Dr. S. Zuckerman and the results published in a bulletin of this Museum entitled 'The Adichanallur skulls' (1930). The work of Mr. V. D. Krishnaswami on the palaeolithic of Madras in the valley of Corteliyar (1935), and on the team of the Yale-Cambridge expedition to the Soan valley in the Punjab (1935-36), the collection and study of the palaeolithic of Nellore by Drs. F. P. Manley and A. Aiyappan (1942) and the work of Dr. A. Aiyappan on the mesolithic of Sawyerpuram in Tirunelveli in Southern India are among the outstanding pioneer researches in prehistory sponsored by this Museum. The collections obtained as a result of these works along with the earlier catalogued collections constitute one of the largest index collections for the prehistory of India.

Ethnology :--The ethnographic survey of the Madras Presidency by Dr. Edgar Thurston was begun in 1894 when Anthropology came to be recognized as a post-graduate subject in the University of Madras. Thurston's survey which was part of the Ethnographic Survey of India by Sir Herbert Risley, culminated in the publication in seven volumes of the 'Castes and Tribes of Southern India' (1909). In this survey Dr. Thurston was assisted by Mr. K. Rangachari, who, as ethnological assistant of this Museum has to his credit a bulletin on 'The Sri Vaishnava Brahmans' (1931). On the suggestion of Sir George Grierson who conducted the linguistic survey of India, a survey of the dialects and languages of the Madras Presidency was carried out by this Museum in 1922-27. The results of the survey are preserved in gramophone records and the text of the passages was published in 1927. The survey recorded not only the dialects of the literate groups in Southern India like Tamil, Telugu, Malayalam, Canarese

and Marathi but also the languages of the aboriginal tribes such as Toda, Kota, Kurumba, Irula, Gadaba, Khond, Koya and Saora. A catalogue of the Musical Instruments in the Museum by Prof. P. Sambamoorthy was published in 1931 and this is now in its second edition. The work of Dr. A. Aiyappan on the 'Nayadis of Malabar' (1937) and 'Iravas and Culture change' (1944) revived the scope of ethnographic studies in museum research. Dr. A. Aiyappan's report on the 'Socio-Economic conditions of the Aboriginal Tribes of the province of Madras' (1948) and Prince Peter of Greece's 'Sumerian Survivals in Toda Ritual' (1952) are the other outstanding publications of this Museum.

In recent years the Anthropological section of the Museum, by virtue of its large index collections of ethnographic materials and prehistoric antiquities and its laboratory facilities in Physical Anthropology, is connected with the teaching and training of the University students undergoing post-graduate courses of study in Anthropology besides affording research facilities to scholars and students in the subjects. The Social Sciences Association of Madras, an organisation sponsored by the Anthropological section of the Museum, published as the proceedings of the All India Conference of Anthropologists and Sociologists held in Madras in 1955, 'Society in India' in which problems of research and teaching in the social sciences find a prominent place. Among the subjects on which research has been carried out in recent years by Mr. C. J. Jayadev, former Curator for Anthropology besides his teaching work for (1) the Bharatiya Adimjati Seva Sangh, (2) for the Madras School of Social work as visiting lecturer in Sociology and (3) for the University of Madras a part time lecturer in Anthropology are (1) The Tribal peoples of the Kolli Hills, Salem, and the Attapady Hills, Kerala (2) An Ethno-Historic study of the Tali Rite on which a paper was read before the Archaeological Society of South India (3) The Incidence of Suicide in South India in 1954 on which a paper was read before the All India Conference of Sociologists and Anthropologists and (4) a Guide book to the anthropological galleries in Tamil with Mr. M. Raghupathy as the joint author. The English version is in the Press.

CHEMICAL CONSERVATION SECTION

From the very beginning, this Museum has had the reputation of promoting research in Chemical Conservation. The very design and installation of the equipment for electrolytic

restoration set up here in 1930 involved some preliminary scientific investigation. The process had to be adapted here for restoration of bronzes of a size not dealt with anywhere else before. The method was suggested by Professor E. Smith and the details worked out by Dr. S. Paramasivan, the first Curator of the Chemical Conservation Section. The Section owes not a little to the encouragement and facilities offered by Dr. F. H. Gravely as the Superintendent of the Museum. Dr. Paramasivan published a paper on the process adopted here in the "*Proceedings of the Indian Academy of Sciences*" in 1941.

But the bulk of the research work done in this section relates to the technique of wall paintings in ancient India. As Curator of the Section, Dr. Paramasivan undertook a series of scientific investigations into the techniques of ancient paintings. As he puts it in a letter to "*Nature*" of May. 23, 1936, "While scientific investigation into the technique of the methods of production of the mural paintings in the Palace of Minos at Knosses, in Pompei etc., have been conducted by Noel Heaton, Eibner, Borger, Raehlmann and others, very little has been done in this direction in the East. With the exception of the work on the Ajanta frescoes, of which, however, details of investigation are not available, nothing has been done to reconstruct the exact methods of production of ancient paintings in India and compare them not only with the methods suggested in Indian texts on paintings but also with those adopted in the West in ancient times." It is this lacuna that he sought to fill up by his investigations. His researches covered ancient wall paintings at Ajanta, Bagh, Badami, Sittannavasal, Conjeevaram, Tanjore, Ellora, Vijayalayacholisvaram, Cochin and Travancore, Lepakshi and Somapalayam, Tirumalai, Mamandur and Tiruparuttikunram. At every place he analysed the nature of the pigments used, the ground and the probable method employed in laying them. The results of the researches were published severally in *Nature*, "*The Journal of the Madras University*", "*Technical Studies*", "*Proceedings of the Indian Academy of Sciences*", etc.

Besides investigating the technique of the paintings, Dr. Paramasivan undertook the preservation of frescoes at Sittannavasal in the Madras State. A paper on the subject was published in the *Journal of the Madras University*, Volume XIII, No. 1. The metallurgical investigation of a prehistoric bronze bowl and ancient Indian bronze coins of the 2nd and 11th centuries, were also conducted and formed the subject of a paper

published by him. Mr. R. Subramanian, who was also sometime Curator of the Section and had worked with Dr. R. J. Gettens at the Smithsonian Institution on metallurgical techniques and problems of corrosion of antique objects, has published a paper on the analysis of blue glass beads from Arikamedu in *Current Science*, January, 1950.

A paper entitled "Study of Weight Standards of Silver Punchmarked Coins of Mambalam and Bodinayakanur Hoards" was published by Mr. B. Ramachandran, a former Curator of the Section, in "*Transactions of the Archaeological Society of South India*" for the year 1957-58.

Some work has been done in this Section on methods of making elastic moulds with the help of latex or *Gracilaria lichinoides*; new methods of restoration like the use of Amberlite IR-120 for lead objects, first suggested at the British Museum, have been adopted and their extension to objects of other metals, tried. Investigations are being made into the possible changes which occur with time in the material of stone images. The treatment of two antique Kalamkarai textiles, involved some experiments in methods of cleaning textiles, including the removal of old stains. This gives valuable insight into similar problems with other old textiles. Likewise the treatment of every object that presents unique features of decay requires much preliminary investigation and devising of new techniques.

APPENDIX

List of Publications of the Madras Government Museum.

NEW SERIES

| Volume and number. | Description. | Number of pages. | Number of plates. | Price. Rs. nP. |
|-----------------------------------|---|---------------------|----------------------|-----------------------|
| Natural History Section. | | | | |
| Vol. I, No. 1, 1927. | The Littoral Fauna of Krusadai Island in the Gulf of Manaar, with appendices on the vertebrates and plants. By various authors. | 196 | 26 | 8 00 |
| † Vol. I, No. 2, Part 1, 1933. | Supplement to the Littoral Fauna of Krusadai Island in the Gulf of Manaar—Polychaeta by P. Fauvel, Pycnogonida by B. Sundara Raj, and Alpheidae by F. H. Gravely. | 79 | 1 | 2 00 |
| † Vol. I, No. 2, Part 2, 1931. | Three Species of Alcyonaria. By Sydney J. Hickson, F.R.S. (with three text figures). | 9 | Nil. | 0 25 |
| † Vol. I, No. 2, Part 3, 1936. | Scyphomedusae of Krusadai Island. By M.G.K. Menon, M.A. | 9 | 1 | 0 50 |
| † Vol. I, No. 2, Part 4, 1937. | Supplement to the Littoral Fauna of Krusadai Island in the Gulf of Manaar—Porifera. By M. Burton, D.Sc. | 58 | 9 | 1 87 |
| • Vol. I, No. 2, Part 5, 1943. | The Foraminifera of Krusadai Island in the Gulf of Manaar. By C. P. Gnanamuthu, M.A., D.Sc., F.Z.S. | 21 | 4 | 1 37 |
| Vol. I, No. 2, Part 6. | Amphineura and Gastropods of Krusadai Island. By S. Thomas Satyamurti, M.A., F.Z.S. | 264 | 34 | 10 75 |
| Vol. I, No. 2, Part 7. | Scaphopoda, Pectycypoda and Cephalopoda of Krusadai Island. By S. T. Satyamurti, M.A., D.Sc., F.Z.S. | 202 | 30 | 9 37 |
| • Vol. II, 1929. | The Flowering Plants of the Madras City and its immediate neighbourhood. By P. V. Mayuraoathan, B.A., Botanical Assistant, Madras Museum. | 345 | 38 | 8 00 |
| Vol. III, No. 1, 1930. | The Scyphomedusae of Madras and the neighbouring coast. By M. G. K. Menon, M.A., Research Scholar, Madras University Zoological Laboratory. | 28 | 3 | 1 12 |
| Vol. III, No. 2, 1932. | The Hydromedusae of Madras. By M. G. K. Menon, M. A. | 32 | 3 | 1 12 |

† This number is reserved for supplements to Krusadai Island Fauna.

• Out of Stock.

| Volume and number. | Description. | Number of pages. | Number of plates. | Price. |
|--------------------------------|--|---------------------|----------------------|------------------------------------|
| | | | | Rs. oP. |
| Natural History Section.—cont. | | | | |
| Vol. III, No. 3, 1933. | The Life Histories of Decapod Crustacea from Madras. By M. Krishna Menon, M.A. | 45 | 10 | Bound in one volume. 2 37 |
| Vol. III, No. 4, 1933. | Sagitta of the Madras Coast. By C. C. John, M.A., D.Sc. | 10 | 1 | |
| Vol. III, No. 5, 1937. | Decapod Larvae from the Madras Plankton. By M. Krishna Menon, M.A., M.Sc. | 55 | 9 | 1 87 |
| Vol. III, No. 6, 1940. | Decapod Larvae from the Madras Plankton—II. By M. Krishna Menon, M.A., M.Sc. | 77 | 8 | 1 50 |
| Vol. IV, No. 1, 1931. | The Indian Species of Genus <i>Caralluma</i> (Fam. Asclepiadaceae). By F. H. Gravely, D.Sc., and P. V. Mayura-nathan, B.A., Government Museum, Madras. | 28 | 4 | 1 50 |
| • Vol. IV, No. 2, 1938. | Supplement to the Flowering Plants of Madras City and its immediate neighbourhood. By E. Barnes, D.Sc. | 46 | 7 | 1 67 |
| Vol. V, No. 1, 1941. | Shells and other Animal Remains found on the Madras Beach. I. Groups other than Snails, etc. By F. H. Gravely, D.Sc. | 112 | Nil. | 3 12 |
| Vol. V, No. 2, 1942. | Shells and other Animal Remains found on the Madras Beach. II Snails, etc. (Mollusca Gastropoda). By F. H. Gravely, D.Sc. | 110 | Nil. | 2 75 |
| Vol. VI, No. 1, 1949. | The Thaliacea of the Madras Plankton. By R. Velappan Nair, M.Sc. | 41 | 6 | 1 75 |
| Vol. VI, No. 2, 1959. | Cirripedia of the Madras Coast. By A. Daniel. | 40 | 16 | 2 37 |
| Vol. VI, No. 3, 1959. | The Amphipoda of the Madras Coast. By K. Nagappan Nair, M.Sc. | 59 | 16 | 4 35 |
| Vol. VI, No. 4, 1960. | The Land and Freshwater Mollusca in the Collection of the Madras Government Museum. By S. T. Satyamurti, M.A., D.Sc., F.Z.S. | 174 | 21 | 13 00 |
| 1960 | Guide to the Snakes exhibited in the Reptile Gallery By S. T. Satyamurti, M.A., D.Sc., F.Z.S. | 25 | — | 00 75 |
| 1961 | Guide to the Snakes exhibited in the Reptile gallery (Tamil) By S. T. Satyamurti, M.A., D.Sc., F.Z.S. | 26 | ... | 0 62 |
| 1962 | Guide to the Lizards, crocodiles, turtles, and tortoises exhibited in the Reptile gallery By S. T. Satyamurti, M.A., D.Sc., F.Z.S. | 45 | .. | 1 37 |
| 1963 | Guide to the galleries of Foreign animals general Zoology and skeletal exhibits and Amphibians By S. T. Satyamurti, M.A., D.Sc., F.Z.S. | 65 | ... | 3 00 |

• Out of stock.

| Volume and number. | Description. | Number of pages. | Number of plates | Price. |
|--|--|---------------------|---------------------|---------|
| | | | | Rs. nP. |
| General Section (with separate volumes for Anthropology and Archaeology respectively). | | | | |
| Vol. 1, No. 1. 1929. | Buddhist Sculptures from a Stupa near Goll village, Guntur district. By T. N. Ramachandran, M.A. | 44 | 4 | 1 55 |
| * Vol. 1, No. 2. 1932. | Catalogue of the South Indian Hindu Metal Images in the Madras Government Museum. By F. H. Gravely, D.Sc., and T. N. Ramachandran, M.A. | 144 | 23 | 5 50 |
| * Vol. 1, No. 3. 1934. | Tiruparuttikondram and its temples with appendices on Jaina units of measurement and time, cosmology and classification of souls. By T. N. Ramachandran, M.A. | 260 | 37 | 11 25 |
| Vol. II, No. 1. 1930. | The Adichanallur skulls. By S. Zuckerman, M.A., M.R.C.S., L.R.C.P., with Notes by Prof. G. Elliot Smith, F.R.S. | 24 | 3 | 1 37 |
| Vol. II, No. 2. 1931. | The Sri Vaishnava Brahmans. By Diwan Bahadur K. Rangachari, M.A., L.T. | 158 | 2 | 5 75 |
| Vol. III, No. 3. 1931. | Catalogue of the Musical Instruments exhibited in the Government Museum, Madras. By P. Sambamurthi, B.A., B.L., (Revised Edition) | 25 | 9 | 2 25 |
| * Vol. II, No. 4. 1937. | Social and Physical Anthropology of the Nayadis of Malabar. By A. Aiyappan, M.A., Ph. D. | 141 | 12 | 3 12 |
| Vol. III, No. 1. 1934. | Three Main Styles of Temple Architecture recognised by the Silpa-sastras. By F. H. Gravely, D.Sc., and T. N. Ramachandran, M.A. | 26 | 2 | 1 10 |
| Vol. III, No. 2. 1936. | An Outline of Indian Temple Architecture. By F. H. Gravely, D.Sc. | 23 | 1 | 0 50 |
| Vol. III, No. 3. 1938. | Catalogue of Venetian Coins in the Madras Government Museum By T. G. Aravamuthan, M.A., B.L. | 59 | 1 | 1 50 |
| * Vol. III, No. 4. 1939.. | Indian Epigraphy and South Indian Scripts. By C. Sivaramamurthi, M.A. | 280 | 12 | 14 50 |
| ... | Goide to the Archaeological Galleries. An Introduction to South Indian Temple Architecture and Sculpture By F. H. Gravely, D.Sc., C. Sivaramamurthi, M.A., and other Curators. | 48 | 8 | 0 55 |

* Out of Stock.

| Volume and number. | Description. | Number of pages. | Number of plates. | Price. Rs. nP. |
|--|---|---------------------|----------------------|-------------------|
| General Section (with separate volumes for Anthropology and Archaeology respectively).—(contd). | | | | |
| 1939 | Illustrations of Indian Sculpture— Mostly Southern. For use with the Guide to the Archaeological Galleries. By F. H. Gravely, D.Sc. and C. Sivaramamurthi, M.A. | ... | 45 | 0 95 |
| Vol. IV, 1942... | Amaravati Sculptures in the Madras Government Museum. By C. Siva- ramamurthi, M.A. | 376 | 65 | 16 50 |
| * Vol. V, No. 1, 1944. | Iravas and Culture Change. By A. Aiyappan, M.A., Ph.D. | 204 | 12 | .6 62 |
| Vol. VI, No. 1, 1952. | Possible Sumerian Survival: In Toda Ritual. By H. R. H. Prince Peter of Greece, M. A. (Hry), LL.D. | 24 | 10 | 6 25 |
| * 1952 | Madras Government Museum Centenary Souvenir (1851-1951). | 158 | 12 | 5 00 |
| 1952 | Guide to the Buddhist Antiquities. By A. Aiyappan M.A., Ph. D. and P. R. Srinivasan, M.A., | 58 | ... | 0 80 |
| * Vol. VII, No. 1, | Nagapattinam Bronzes. By T. N. Rama- chandran, M.A. | 150 | 30 | 6 00 |
| 1953 | Coins of India Through the ages ... | 17 | 3 | 0 40 |
| Vol. I, Pt. 1, 1957. | Early Eastern Chalukyan Sculpture. By C. Sivaramamurti, M.A. | 71 | 35 | 2 90 |
| Vol. VII, No. 3, 1959. | Select Satavahana Coins in the Madras Government Museum. By M. Rama Rao, M.A., Ph. D. | 23 | 2 | 1 75 |
| Vol. VII, No. 4, 1959. | Beginnings of the Traditions of South Indian Temple Architecture. By P. R. Srinivasan, M.A. | 34 | ... | 1 70 |
| Vol. VII, No. 5, 1959. | The Gopuras of Tiruvannamalai. By F. H. Gravely, D. Sc., | 8 | 13 | 5 90 |
| 1960 | Handbook of Museum Technique. Edited By A. Aiyappan, M.A., Ph. D., and S. T. Satyamurti, M.A., D. Sc., F.Z.S. | 228 | 11 | 2 75 |
| 1960 | Scripts in and around India By V. Kannaiyan, B.A. | 44 | ... | 2 |
| 1961 | Kalai chelvangal By R. Nagaswami, M.A. | 68 | 40 | 1 00 |
| 1962 | Pazankala Panpadum. Pazankudikalin Panpadum By C. J. Jayadev, M.A., L.T. and M. Raghupathy, M.A. | 61 | ... | 1 60 |
| Vol. VIII, 1963. | Bronzes of South India By P. R. Srimi- vasan, M. A. | 396 | 205 | 57 00 |

* Out of Stock.

OLD SERIES

| Description. | Price | |
|--|-------|----|
| | Rs. | np |
| • 1. Catalogue of Pre-historic Antiquities—By R. Bruce Foote—1901. | 5 | 25 |
| 2. The Foote Collection of Indian Pre-historic and Protohistoric Antiquities. Catalogue Raisonné—By R. Bruce Foote—1914 ... | 2 | 00 |
| 3. Catalogue of Pre-historic Antiquities from Adichanallur and Perumbair—By A. Rea—1915 | 1 | 50 |
| 4. The Foote Collection of Indian Pre-historic and Protohistoric Antiquities. Notes on their Ages and Distribution—By R. Bruce Foote—1916 | 9 | 75 |
| • 5. Catalogue of Exhibits in the Economic Products Section except wood specimens—By S. N. Chandrasekhara Ayyar—1921 ... | 2 | 12 |
| 6. Catalogue of the coins of Haider Ali and Tippu Sultan—By J. R. Henderson—1921 | 4 | 00 |
| • 7. Catalogue of copper-plate grants | 0 | 87 |
| 8. Gramophone records of the languages and dialects of the Madras Presidency. Text of Passages | 1 | 25 |
| • 9. Catalogue of Batrachia, Salientia and Apoda (Frogs, Toads and Coccilians of South India)—By E. Thurston—1888 ... | 2 | 50 |
| • 10. Guide to the Natural History and Mineral Galleries—1893 ... | 0 | 13 |
| • 11. Science Series No. 1—Preliminary Report on the Marine Fauna of Rameswaram—1887 | 0 | 62 |
| • 12. Coins of Sultans of Delhi—By E. Thurston—1893 | 0 | 19 |

Bulletins (Old Series)

| Volume and number | Description. | Price | |
|-------------------------|--|-------|-----|
| | | Rs. | np. |
| • 1. No. 1 | Pearl and Chank Fisheries in the Gulf of Manjer. By E. Thurston—1895 ... | 1 | 25 |
| 2. No. 3 | Rameswaram Island and Fauna of the Gulf of Mannar. By E. Thurston—1895 ... | 1 | 50 |
| • 3. Vol. II, No. 1 .. | Anthropology: Badagas and Irulas of the Nilgiris. Panivans of Malabar: A Chinese-Tamil Cross. A Cheruman skull; Kuruba or Kurumba; Summary of results. By E. Thurston—1897 ... | 2 | 00 |
| 4. Vol. II, No. 2 ... | Anthropology: Eurasians of Madras and Malabar: Note on Their Tattooling, etc. By E. Thurston—1898 | 1 | 00 |
| 5. Vol. III, No. 2 ... | The Sea Fisheries of Malabar and South Kanara. By E. Thurston—1900 ... | 1 | 25 |
| 6. Vol. III, No. 3 .. | Anthropology: Nayers of Malabar. By T. Fawcett—1901 | 1 | 50 |
| • 7. Vol. IV, No. 2 ... | Anthropology: The Dravidian Head Yanadis of Nellore—1902 ... | 1 | 10 |
| • 8. Vol. IV, No. 3 ... | Anthropology: Some Marriage Customs in South India: Deformity and Mutilation. Uralis, Sholagas and Irulas: Fire-walking in Ganjam. Corporal punishment in vernacular schools—1903 | — | 75 |
| • 9. Vol. V No. 1 ... | Anthropology: Vision of the Uralis and Sholagas: More marriage customs in Southern India: Hook-swinging. Putayans—1903 | — | 100 |

* Out of Stock.

EDUCATIONAL SERVICES OF THE MADRAS GOVERNMENT MUSEUM

BY

S. T. SATYAMURTI, M.A., D.Sc., F.Z.S.
(Superintendent, Government Museum, Madras)

Museums are no longer mere repositories of lifeless objects or houses of curios. They are beginning to assume an increasingly dynamic role in modern life and there is now a growing realization, all over the world, of the vital role that museums can play in the education of the child and the adult, the literate and the illiterate, the able and the handicapped. In keeping with this modern trend, the Madras Museum has expanded its educational activities considerably during recent years. Attempts are being made to make the Museum and its contents more meaningful, useful, and at the same time enjoyable to the public in various ways. In fact, the value of a Museum depends largely on the extent to which its collections are being interpreted and utilised for the education of the masses and it is with this object in view that several schemes of planned educational activity have been drawn up in this Museum. Some of the means by which the Madras Museum has been trying to make itself more educationally useful are briefly outlined below.

Special Exhibitions:—

These have now become immensely popular and are a regular feature of our educational activities. Special exhibitions are organized from time to time to focus the attention of the public on any recent acquisitions or to mark special occasions. As instances of the latter category may be mentioned the Special exhibitions which were arranged to commemorate the Centenary of the Madras Museum, the Buddha Jayanthi Celebrations, the International Museum Week, the Annual Wild Life Weeks and the Darwinian Centenary. Such exhibitions attract large numbers of school children and college students and help to stimulate in them a deeper interest in the Museum collections, apart from serving to invite the attention of the public to such events. Special Child Art Exhibitions have also been organized from time to time by the Madras Museum and these, together with the well known International Children's Art exhibitions which were

being held at the Museum annually by Shanker's Weekly, have been very effective in encouraging Child Art in the Madras State. The Museum has also frequently participated in National and International Exhibitions such as the Congress Exhibition at Teynampet, the India 1958 Exhibition held at New Delhi and the Villa Hugel Exhibition of Indian Art held in Essen, in West Germany in the year 1959.

Summer Courses in Museum Technique:—

Under the Second Five Year Plan, the Museum imparted practical training in Museum work to two batches of 40 teachers each from schools all over the State, every year during the summer months, so as to help them to organize school museums of their own, and a comprehensive scheme for training at least about four hundred teachers in Museum Technique during the Second Five Year Plan period was drawn up (Fig. 157).

The course became fairly standardised and formed a significant part of the educational services rendered by this Museum for a number of years. A comprehensive syllabus covering techniques relating to all the sections represented in the Museum was prepared with special emphasis on the practical aspects of the subjects. The course extended over fourteen full working days and included theoretical instruction as well as demonstrations and practical classes in elementary taxidermy, moulding, casting, modelling in plaster and wax, methods of collecting, preserving, mounting, labelling, storage and display of Zoological, Botanical, Geological, Numismatic, Archaeological and Ethnographical material, methods of Chemical Conservation of museum objects for which the Museum has a well equipped Chemical Laboratory, and guided tours around the public galleries so as to give the trainees a thorough grounding in all aspects of the subject of museum organisation and maintenance, in so far as they relate to the needs of school museums.

In order to make the course really useful it was found necessary to make it as practical as possible especially in subjects relating to natural history, such as Botany and Zoology, in which the success of the museum builder largely depended upon the practical ability, skill and resourcefulness of the trainees as it was not easy to make things which were perishable last long and look real and life-like, and several technical processes were involved in the preservation of these objects. The techniques were therefore first demonstrated to the trainees and then each of the

trainees was given a specimen which he himself preserved and mounted as if he were mounting it for his own school museum. The trainee thus learnt by doing and this was perhaps the most effective way of learning. The members of the technical staff of the Museum consisting of the Curators, taxidermists and attenders were always ready to extend every possible help to the trainees during these courses and were kept busy throughout the progress of the course as individual attention had to be paid to the trainees at every stage, especially during the practical classes in Zoology and Botany.

As the trainees deputed for this course had different educational backgrounds there was necessarily some initial difficulty in adjusting themselves to the subjects in the Museum Technique syllabus with which they were unfamiliar, and the more sentimental among them often felt reluctant to handle, skin and dissect zoological specimens which generally involved much dirty work. But these difficulties were soon overcome in their enthusiasm to learn these interesting processes, and trainees generally turned out to be a much happier lot when they left us than when they first arrived here, when most of them had little idea of what they were expected to do at these classes.

The various subjects dealt with in the Museum were distributed over the fourteen working days of the course as follows: six days for Zoology, three for Botany and Geology, two for Anthropology and one day each for Archaeology, Numismatics and Chemical Conservation.

These summer courses were very popular and the teachers evinced greater interest in the techniques taught here year by year.

This Museum has also published a comprehensive Handbook on Museum Technique covering all aspects of Museum organisation for the benefit of the trainees. It must be said to the credit of the Madras Government Museum that it is the only Museum in India which ever conducted specific training courses in Museum methods and brought out a useful publication on the various techniques of Museum work.

Lectures to College Students:—

Under a scheme drawn up by Government under the Second Five Year Plan, the Superintendent and each of the Curators in the Museum delivered a series of three lectures every year

on selected topics in their respective fields for the benefit of students of the various colleges in the City. Although at first the response from the students was not very encouraging, these lectures were popular and were well attended. They were illustrated by specially made lantern slides for which special financial provision was made. Some of the lectures delivered were on the following topics: "South Indian Temple Architecture", "Wall Paintings of South India from the earliest time to 700 A.D.", "Megaliths of South India", the "Attapady Tribes", "South Indian Molluscs", "Economic Zoology", "Landscape Gardening", "Plant Surgery", "Primitive Money" and "Bioluminescence". These lectures were till recently a regular annual feature of our educational activities and efforts were being made to organize them on a more popular basis year by year, but unfortunately they had to be discontinued on account of the National Emergency. However lectures are being delivered to the University students in Archaeology and Anthropology.

Visual Aid Programme :—

As part of the Audio-Visual Aid Programme of this Museum, sets of electroplated casts of thirty-two Indian coins representing Indian Coinage from about the sixth century B.C. to the time of the East India Company, are offered by the Museum for sale to schools and educational institutions with an illustrated booklet which serves as a handy guide to the study of the coins of the dynasties and periods represented in the set (Fig. 158). The Museum also offers its surplus coins and plaster casts of coins for sale to the public after distributing coins to other institutions.

Recently, miniature bronze replicas of the world famous Thiruvallangadu Nataraja (Fig. 159) and Rama and Sita from Vadakkupaniyur exhibited in the National Art Gallery have been prepared and kept for sale at Rs. 200/- and Rs. 325/- each, respectively. It is hoped that these will prove to be popular especially with foreign visitors who would like to take back with them a handsome piece representative of the art and culture of this country as a souvenir.

Photographs and picture post cards depicting some of the outstanding exhibits in the Museum have also been prepared and kept for sale. Among others, these include a series of twelve post cards of some of the best bronzes in the Museum collection and recently colour reproductions of two of the most outstanding

paintings in the National Art Gallery, and sets of coloured picture post cards illustrating the common birds and flowers of Madras have been prepared and released for sale. This is the first time in the history of the Museum that an attempt had been made to have Natural History picture postcards prepared in colour for sale to the public. It is hoped to extend this series so as to include other attractive subjects such as fruits butterflies, minerals, etc., in the future. Recently, photographic albums in different sizes illustrating the best specimens of South Indian Art in the collection of this Museum have also been prepared for sale.

Loan of Circulating Collections of Paintings to Schools:—

Over two hundred and fifty paintings representing the Rajput, the Mughal, the Deccani and the Tanjore schools that were kept stored in the reserve collection of the Archaeological Section of this Museum were divided into sixteen sets. Each set contained a few specimens of each of the above mentioned schools of painting. These sets were circulated round the thousand and odd high schools scattered all over in the Madras State. A set was given on loan to a high school for six months. During this period the authorities of the school were requested to display the paintings in a prominent place where they would attract the attention of the pupils. The main purpose of this undertaking was to give the young students an opportunity to get acquainted with the original works produced by the various traditional schools of painting. While sending the paintings, a brief label giving the title of the painting, the school to which it belonged and the technique in which it had been done was furnished in respect of each item.

The reactions of the pupils and teachers of the high schools benefitted by this scheme were very favourable. It was encouraging to observe that these circulating sets served to kindle in the young students a genuine interest in the original works relating to the various traditional schools of Indian painting.

Guide Service:—

The Museum has on its staff two Gallery guides who offer free guide service to the visiting public who wish to avail themselves of such service at certain specified hours of the day. In addition to these, an official guide for the National Art Gallery has also been recently appointed. These guides explain the exhibits in the galleries in simple language, mostly in the

vernacular. This service has proved to be a boon mainly for the illiterate visitors who are not in a position to read the labels (Fig. 160). These guides are also particularly helpful in guiding parties of school children around the galleries.

Demonstrations to School Teachers :—

Every year, on Saturdays during the months of December and January, parties of teachers from various schools in the City are taken round the galleries by the Curators of the respective sections, who explain in detail the significance of the exhibits to the teachers. This was among the earliest of the educational activities to be organised in this museum. The object of these demonstrations is to enable the teachers to have an intelligent grasp of the objects displayed in the Museum so that they, in their turn, will be able to satisfactorily guide their pupils when they are brought to the Museum on their routine visits. During these demonstrations, special efforts are being made to relate the explanations to the specific needs of the school curricula.

Facilities to Research workers, Scholars and Students :—

The Madras Museum has always maintained a commendable record of service to research workers and scholars in the various spheres of knowledge lying within its scope. Besides the exhibited material in the galleries, the Museum possesses large reference collections which are available for study and research by scholars and research workers by special appointment and facilities are freely offered for such study. Students, teachers, and laymen are offered every possible help in identifying specimens of plants, minerals, animals, coins, prehistoric antiquities and specimens of archaeological interest which they may happen to collect during the course of their field trips and excursions. Enquiries on matters relating to the various subjects covered by the Museum collections keep pouring in constantly and every effort is made by the Curatorial staff of the Museum to answer these as promptly and as accurately as possible. Information on the identity, provenance, antiquity, and cultural associations of various ethnographical and archaeological objects is also furnished whenever the Museum is approached for such help. The Museum has also been popular as a meeting place for several learned societies. The Archaeological Society of South India, the Social Sciences Association, the South India Society of Painters, and recently, the Madras Zoological Society, have been regularly meeting in its premises for their periodical lectures, meetings and other activities. The Museum is also fortunate in

possessing a well-equipped auditorium—the Museum Theatre—with an accommodation for about 530 persons. This is being regularly used for educational lectures, dramatic entertainments and cultural performances. Such an auditorium is an indispensable adjunct to a modern museum, and proposals have now been submitted for modernising its stage lighting and other installations. The Centenary Exhibition Hall is another part of the Museum building that is being increasingly utilized for educational purposes. It is let out frequently for meetings of cultural organisations and for exhibitions of paintings and works of art at a nominal rent. A portion of this hall is being converted into a permanent Gallery to exhibit models of excavated objects from Nagarjunakonda and other Buddhist antiquities.

Museums thus have an important and almost unique part to play in education, meeting the needs of both formal and informal instruction, of children as well as adults. There are no frontiers to restrict the exploration of the mind with the aid of museum collections. It is gratifying to observe that the Madras Museum, in spite of the limitations imposed on it by staff, accommodation and finances, has earned an enviable reputation for educational activities and research. In planning for its future, it is well to remember that apart from the passive role of the museum in collecting and preserving material, it has an even more important, active and dynamic role to play in interpreting this material and making the collections more educationally useful and it is this aspect of museum work that has lent museums the charm and vitality which they lacked some decades ago.



Fig. 157. THE MUSEUM TECHNIQUE COURSE



Fig. 158. ELECTROPLATED CASTS OF A SET OF COINS OF INDIA



Fig. 159. MINIATURE BRONZE REPLICA OF
NATARAJA FROM TIRUVALANGADU



Fig. 160. GUIDE SERVICE TO ILLITERATE VISITORS

